VOLUME 24 / NUMBER 8
APRIL 23, 1986
ACC. NOS. N86-17267 TO N86-18283

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
BRANCH

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to the NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Maryland 21240.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

The semimonthly issues are available for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION BRANCH
Scientific and Technical Aerospace Reports, Volume 24, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by RMS Associates.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through March 22, 1988.

US ISSN 0036-8741

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

SUBJECT SCOPE

Subject scope of *STAR*, and *IAA* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

OTHER NASA PUBLICATIONS

Other NASA publications and information services are described in the publication, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Maryland 21240.

HOW TO USE *STAR* SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

DOCUMENTS ON MICROFICHE

Documents on microfiche(1) are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, as indicated above, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Adminstration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its' Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of $1.50 each, postage free. (See discussion of NASA patents and patent applications below.)

Avail: ESDU. Pricing information on specific data, computer programs, and details on ESDU topic categories can be obtained from ESDU International Ltd. Requesters in North America should use the Virginia address while all other requesters should use the London address, both of which are on page vi.

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02. Microfiche are sold at price code A01. The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at $1.50 per copy from:

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;
2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
ATTN: Registration Activity
P.O. Box 8757
B.W.I. Airport, Maryland 21240

Organizations abroad should direct requests to the same address, but to the attention of: International Exchange Program.

AVAILABILITY OF *STAR* ABSTRACTS ON MICROFICHE

Microfiche of the abstract sections of this issue and other issues of *STAR* are available on annual subscription from NTIS, Attn: Subscriptions, 5285 Port Royal Road, Springfield, Virginia 22161. Annual subscription rates are $70.00 North America; $140.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates. Microfiche for individual *STAR* issue abstract sections are not available.

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC: NASA and NASA-sponsored documents and a large number of aerospace publications are available to the public for reference purposes at the library maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

EUROPEAN: An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England for public access. The British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols # and * from ESA - Information Retrieval Service European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

FEDERAL DEPOSITORY LIBRARY PROGRAM

In order to provide the general public with greater access to U.S. Government publications, Congress established the Federal Depository Library Program under the Government Printing Office (GPO), with 50 regional depositories responsible for permanent retention of material, inter-library loan, and reference services. At least one copy of nearly every NASA and NASA-sponsored publication, either in printed or microfiche format, is received and retained by the 50 regional depositories. A list of the regional GPO libraries, arranged alphabetically by state, appears on the inside back cover. These libraries are *not* sales outlets. A local library can contact a Regional Depository to help locate specific reports, or direct contact may be made by an individual.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, New York 10019

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

ESDU International, Ltd.
1495 Chain Bridge Road
McLean, Virginia 22101

ESDU International, Ltd.
251-259 Regent Street
London, W1R 7AD, England

Fachinformationszentrum Energie, Physik, Mathematik GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information Facility
P.O. Box 8757
B.W.I. Airport, Maryland 21240

National Aeronautics and Space Administration
Scientific and Technical Information Branch (NIT-1)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey Library
National Center – MS 950
12201 Sunrise Valley Drive
Reston, Virginia 22092

U.S. Geological Survey Library
2255 North Gemini Drive
Flagstaff, Arizona 86001

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey Library
Box 25046
Denver Federal Center, MS 914
Denver, Colorado 80225

NTIS PRICE SCHEDULES

(Effective October 1, 1985)

Schedule A
STANDARD PRICE DOCUMENTS AND MICROFICHE

PRICE CODE	PAGE RANGE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	Microfiche	$ 5.95	$11.90
A02-A03	001-050	9.95	19.90
A04-A05	051-100	11.95	23.90
A06-A09	101-200	16.95	33.90
A10-A13	201-300	22.95	45.90
A14-A17	301-400	28.95	57.90
A18-A21	401-500	34.95	69.90
A22-A25	501-600	40.95	81.90
A99	601-up	*	*
NO1		$40.00	70.00
NO2		40.00	70.00

Schedule E
EXCEPTION PRICE DOCUMENTS AND MICROFICHE

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
E01	$ 7.50	15.00
E02	10.00	20.00
E03	11.00	22.00
E04	13.50	27.00
E05	15.50	31.00
E06	18.00	36.00
E07	20.50	41.00
E08	23.00	46.00
E09	25.50	51.00
E10	28.00	56.00
E11	30.50	61.00
E12	33.00	66.00
E13	35.50	71.00
E14	38.50	77.00
E15	42.00	84.00
E16	46.00	92.00
E17	50.00	100.00
E18	54.00	108.00
E19	60.00	120.00
E20	70.00	140.00
E99	*	*

*Contact NTIS for price quote.

IMPORTANT NOTICE

NTIS Shipping and Handling Charges (effective June 1, 1985)

U.S., Canada, Mexico — ADD $3.00 per TOTAL ORDER

All Other Countries — ADD $4.00 per TOTAL ORDER

Exceptions — Does NOT apply to:

ORDERS REQUESTING NTIS RUSH HANDLING
ORDERS FOR SUBSCRIPTION OR STANDING ORDER PRODUCTS *ONLY*

NOTE: Each additional delivery address on an order requires a separate shipping and handling charge.

VOLUME 24 NUMBER 8 / APRIL 23, 1986

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics.*

01 AERONAUTICS (GENERAL) 1207

02 AERODYNAMICS 1212
Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.
For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY 1217
Includes passenger and cargo air transport operations; and aircraft accidents.
For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 1217
Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.
For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications.*

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 1218
Includes aircraft simulation technology.
For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

06 AIRCRAFT INSTRUMENTATION 1220
Includes cockpit and cabin display devices; and flight instruments.
For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

07 AIRCRAFT PROPULSION AND POWER 1221
Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.
For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

08 AIRCRAFT STABILITY AND CONTROL 1221
Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 1221
Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.
For related information see also *14 Ground Support Systems and Facilities (Space).*

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) 1222
For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

13 ASTRODYNAMICS N.A.
Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.
Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.
For related information see also *09 Research and Support Facilities (Air).*

15 LAUNCH VEHICLES AND SPACE VEHICLES 1223
Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 1223
Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.
For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING 1223
Includes telemetry; space communications networks; astronavigation; and radio blackout.
For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 1224
Includes spacecraft thermal and environmental control; and attitude control.
For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

19 SPACECRAFT INSTRUMENTATION 1225
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

20 SPACECRAFT PROPULSION AND POWER 1226
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 1241
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 1241
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 1244
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics.*

26 METALLIC MATERIALS 1248
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 1255
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 1257
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics.*

31 ENGINEERING (GENERAL) 1258
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 1259
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

33 ELECTRONICS AND ELECTRICAL ENGINEERING 1263
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

34 FLUID MECHANICS AND HEAT TRANSFER 1271
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

35 INSTRUMENTATION AND PHOTOGRAPHY 1279
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation.*

36 LASERS AND MASERS 1283
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 1286
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 1289
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 1291
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) N.A.

43 EARTH RESOURCES 1296
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION 1300
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

45 ENVIRONMENT POLLUTION 1308
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 1313
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY 1316
Includes weather forecasting and modification.

48 OCEANOGRAPHY 1319
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 1320
Includes genetics.

52 AEROSPACE MEDICINE 1321
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 1322
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 1322
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) 1323

60 COMPUTER OPERATIONS AND HARDWARE 1324
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE 1325
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 1330
Includes computer networks.

63 CYBERNETICS 1331
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS 1333
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 1338
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 1339
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 1339
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering.*

70 PHYSICS (GENERAL) 1340
For geophysics see *46 Geophysics.* For astrophysics see *90 Astrophysics.* For solar physics see *92 Solar Physics.*

71 ACOUSTICS 1341
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 1343
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 1347
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 1349
Includes light phenomena.

75 PLASMA PHYSICS 1351
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 1353
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 1357
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **N.A.**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **1359**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **1359**
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **N.A.**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **1360**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **1361**

89 ASTRONOMY **1362**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **1364**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **N.A.**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **1365**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **N.A.**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

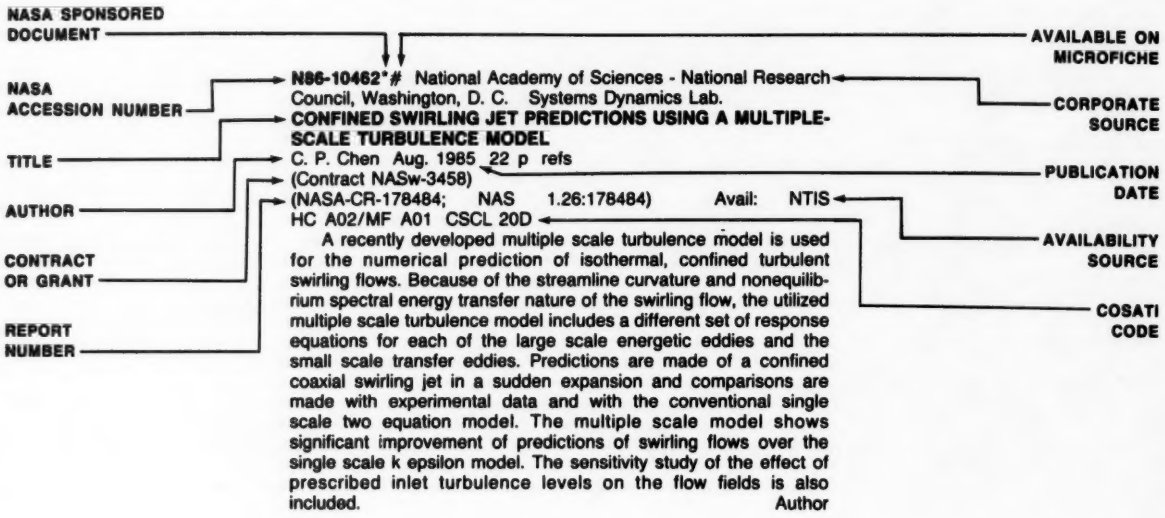
GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX **I-1**
PERSONAL AUTHOR INDEX **I-59**
CORPORATE SOURCE INDEX **I-67**
CONTRACT NUMBER INDEX **I-81**
REPORT/ACCESSION NUMBER INDEX **I-83**

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER
N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.
CORPORATE SOURCE
TITLE
CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL
AUTHOR
C. P. Chen Aug. 1985 22 p refs
PUBLICATION DATE
CONTRACT OR GRANT
(Contract NASw-3458)
REPORT NUMBER
(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS
AVAILABILITY SOURCE
HC A02/MF A01 CSCL 20D
COSATI CODE
A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 8 / APRIL 23, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-17267# National Aerospace Lab., Tokyo (Japan).
PROCEEDINGS OF THE 2ND NAL SYMPOSIUM ON AIRCRAFT COMPUTATIONAL AERODYNAMICS
1984 321 p refs In JAPANESE and ENGLISH Symposium held in Tokyo, Japan, 5-6 Jul. 1984
(NAL-SP-3; ISSN-0289-260X) Avail: NTIS HC A14/MF A01

Various topics related to fluid flow are discussed. Supersonic flow, computational fluid dynamics, nozzle flow, axial flow turbines, and fuel combustion are among the topics covered. For individual titles, see N86-17268 through N86-17300.

N86-17268# Chiba Univ. (Japan).
SUPERSONIC FLOW ON AXISYMMETRIC BLUNT BODY c02
Nobuhide Nishikawa, Riichi Sakuma, and Yukihiko Inoue *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 1-8 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Inviscid supersonic flows around axisymmetric indented bodies are numerically analyzed by the implicit MacCormack scheme. The scheme has been developed for the strong conservative form of Euler equation. Grid generation by elliptic P.D.E. has been employed for relatively complicated body-shapes. The free stream Mach number ranged from 1.8 to 8.0. Various body shapes are treated such as a sphere, an indented body, and hemisphere cylinder. Some details of the formation of the scheme are described and it is observed that the method is highly efficient except for the region near the stagnation point. Author

N86-17269# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
AN INTERACTIVE DESIGN SYSTEM FOR WINGED SPACE VEHICLE c05
Yoshifumi Inatani, Takashi Abe, Haruo Hosokawa (Japan Information Service, LTD), and Jun Sakamoto (Japan Information Service, LTD) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 9-16 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A design system for use in the preliminary design phase of winged space vehicles is described. Although there are many items which must be taken into account in designing such a vehicle, the present system mainly contains the analysis of sizing, weight properties, low speed and hypersonic aerodynamic characteristics. This is because the key factors which determine the vehicle configuration are a large angle of attack capability at hypersonic speed and a moderate lift-drage ratio at low speed or during landing. Sub-programs in the system are those for generation of vehicle configuration and automatic paneling of body surface, hypersonic aerodynamics by the Newtonean flow approximation, low speed aerodynamics by the Boundary Integral Method, some other sub-systems for I/O and the graphic display of the results. The data handling between each sub-program is made by the designer with the time sharing system. An interactive approach for designing such a vehicle is accomplished by the system. Some results obtained through the design of M-type winged space vehicles are presented. Author

N86-17270# National Aerospace Lab., Tokyo (Japan).
RAREFIED GAS NUMERICAL WIND TUNNEL: MONTE CARLO SIMULATION c09
Katsuhisa Koura *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 17-27 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The rarefied gas numerical wind tunnel is under investigation using the Monte Carlo simulation (MCS) in order to simulate the rarefied gas flow around high-altitude flight bodies and space stations; the collision frequency method (CF-MCS) developed by Koura and the time counter method (TC-MCS) developed by Bird in the direct simulation method are applied. Some CF-MCS results are compared with the rigorous (numerical) solutions of the Boltzmann equation. These results agree within the statistical error with the rigorous solutions; therefore the accuracy of the CF-MCS is sufficiently ascertained. Some problems in the development of the rarefied gas numerical wind tunnel are discussed. Author

N86-17271# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF THE LEADING-EDGE SEPARATION VORTEX OVER DELTA WING c02
Kozo Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 27-34 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A thin-layer Navier-Stokes code capable of predicting steady state viscous flows is applied to complicated three-dimensional flow fields. The code is written in a generalized coordinate system, and a recently developed grid generation procedure is used for the flow-field discretization. Application is made to the vortical flow over a delta wing at high angle of attack, and the computed results are compared with experimental results. The results indicate that the present method can capture the physical phenomenon well. It is served that a leading-edge separation vortex is formed over the wing, as is a secondary separation vortex near the leading edge. The flow field behind the trailing edge is also well described. Author

N86-17272# Tsukuba Univ. (Japan).
CURRENT STATUS OF RESEARCH ON EVOLUTION OF LONGITUDINAL VORTICES IN WALL TURBULENCE c02
Shunichi Tsuge and Hiroshi Sakai *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 35-42 refs In JAPANESE; ENGLISH

summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Current methods of approach to the problem of longitudinal vortices prevailing in a viscous sublayer of wall turbulence are reviewed. Correlations among experimental, computational and theoretical methods are discussed and an alternative formalism to the problem is proposed. The formulation takes into account the uncertainty in their way of identifying turbulent vortices. A solution which is periodic in spanwise direction is obtained and its simularity to what is actually observed or computed through experiments or numerical simulations in a close proximity to the wall is discussed. Author

N86-17273# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF UNSTEADY FLOW AROUND AN AIRFOIL BY FINITE DIFFERENCE SOLUTION OF NAVIER-STOKES EQUATIONS c02
Satoru Ogawa and Tomiko Ishiguro *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 43-52 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A numerical procedure for solving the flow field generated by a moving body is presented based on a finite difference solution of Navier-Stokes equations. A conservation-law form of the equations in a general time-varying coordinate system is derived from the Cartesian expression by applying the concept of Lie derivatives. Specifically, a moving coordinate expression of the streamfunction-vorticity formulation is derived, and is used for the analysis of the dynamic-stall phenomenon of an oscillating airfoil in incompressible flow. A computation example is given for an NACA 0012 airfoil oscillating in pitch at an amplitude of 10 deg about a mean angle of attack of 15 deg with a reduced frequency of 0.4 pi and a Reynolds number of 20,000 based on the chord length and the uniform advance speed of the airfoil. Author

N86-17274# Kyoto Univ. (Japan). Dept. of Aeronautics.
FLOWS OF GAS-PARTICLE MIXTURES WITH SIZE-DISTRIBUTION c34
Ryuji Ishii *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 53-58 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The nozzle flow of gas-particle mixtures is treated by assuming a continuous distribution of particle sizes. A distribution function for the particle radii is introduced in order to take into account the continuous distribution of particle sizes. The flow regimes of interest include continuum, slip, transition and free-molecular flows. The rarefaction effect on the nozzle performance is also investigated in detail. Author

N86-17275# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT OF COMPUTATIONAL FLUID DYNAMICS AT NASA AMES RESEARCH CENTER c34
Mamoru Inouye *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 56-66 refs Previously announced in N85-12866 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Ames Research Center has the lead role among NASA centers to conduct research in computational fluid dynamics. The past, the present, and the future prospects in this field are reviewed. Past accomplishments include pioneering computer simulations of fluid dynamics problems that have made computers valuable in complementing wind tunnels for aerodynamic research. The present facilities include the most powerful computers built in the United States. Three examples of viscous flow simulations are presented: an afterbody with an exhaust plume, a blunt fin mounted on a flat plate, and the space shuttle. The future prospects include implementation of the Numerical Aerodynamic Simulation Processing System that will provide the capability for solving the viscous flow field around an aircraft in a matter of minutes. IAA

N86-17276# Tokyo Univ. (Japan). Dept. of Applied Physics.
DIRECT SIMULATION OF THE INCOMPRESSIBLE FLOW AT HIGH REYNOLDS NUMBER BY FINITE DIFFERENCE METHOD c02
Tetuya Kawamura *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 67-76 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A new upwind scheme for computation of incompressible flow has been developed. It was found that this scheme works well at high Reynolds numbers, even with a limited number of mesh points. By using this scheme, three different types of flows were computed. At first, a cavity flow was simulated at Re=5000, with a 41 x 41 grid, and the results agree very well with the computation with a 257 x 257 by Ghia et al. Secondly, a flow past a circular cylinder was simulated. Results of the detailed calculations of the impulsively started flow at Re=1200 are compared with corresponding experimental observations and the comparison is found satisfactory. A series of calculations of the flow around a circular cylinder with surface roughness was carried out over a Reynolds number range from 1000 to 100,000. Remarkable reduction of drag coefficient was observed, showing that a critical Reynolds number is obtained numerically in this calculation. Thirdly, a three-dimensional turbulent flow in a duct was simulated and large structures in the turbulent flow were captured by this scheme without any turbulence model. Agreement of statistical values with experiments was good. These results show that this scheme is very widely applicable and is robust and easy to program for any type of incompressible flow computations. Author

N86-17277# Ship Research Inst., Tokyo (Japan).
COMPUTATION OF THE TWO-DIMENSIONAL INCOMPRESSIBLE NAVIER-STOKES EQUATIONS USING AN IMPLICIT FACTORED METHOD c34
Yoshiaki Kodama *In* National Aerospace Lab. Proceedings of the 2nd NAL Computational Aerodynamics 1984 p 77-84 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An implicit factored scheme was used for solving the two-dimensional incompressible Navier-Stokes equations. Pseudo compressibility was introduced in the continuity equation. The non-conservation form was chosen for stability. Von Neumann stability analysis with a model scalr equation showed that the present scheme remains stable under arbitrary coordinate transformations, without adding any numerical dissipation term. Calculation was made for a backward-facing step flow with the Reynolds number Re = (U peak times H/nu = 58), where H is a step height. Convergence was obtained after about 300 iterations, using a non-dimensional time step delta t = 1.0. The calculated results show a reasonable tendency, except that small oscillations appear in the pressure distribution near the corner point. This phenomenon needs to be further investigated. Author

N86-17278# Metropolitan Coll. of Technology, Tokyo (Japan).
TRANSONIC INTERNAL FLOW ABOUT AN AIRFOIL OSCILLATING IN PITCH: COMPARISONS BETWEEN COMPUTATION AND EXPERIMENT c02
Toshimasa Shiratori and Yoshimichi Tanida (Tokyo Univ., Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 85-90 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

As a preliminary investigation into the relationship between the transonic flutter characteristics and the shock behavior of a transonic cascade, a numerical analysis using a finite-difference method was carried out for a cascade oscillating in pitch about its midchord anti-phase with each other and a zero stagger angle,

based on an assumption of inviscid flow. The computational method was examined by comparisons of computational results with experimental results of the shock wave periodic movements due to oscillation of the cascade, unsteady surface pressure and aerodynamic instability. Although quantitative differences in both results exists, which were caused by the presence of shock-boundary interaction in real phenomenon, the present computation was useful in the investigation of qualitative aspects of the shock wave behavior, aerodynamic instability and the relations between them. In such computation, it is necessary to make the computational mesh size small in comparison to the displacement of the shock wave. Author

N86-17279# National Aerospace Lab., Tokyo (Japan).
NUMERICAL ANALYSIS OF FULLY THREE-DIMENSIONAL FLOW IN TRANSONIC TURBINE CASCADES c02
Masahiko Koya and Susumu Kotake *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 91-100 refs In JAPANESE; ENGLISH summary Original language document was announced in IAA as A84-46886 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

In order to calculate higher subsonic or transonic flows in highly three-dimensionally twisted turbine blade cascades, the finite volume integral method of solving the governing equations is implemented for the treatment of boundary conditions and the discretization scheme. The developed scheme reduces the discretization error associated with the distorted grid configuration of highly three-dimensional blades. With the developed method, flows in three typical turbine blade cascades have been calculated. The present scheme can be applied to fully three-dimensional flow through complete turbine stages. Author (IAA)

N86-17280# National Aerospace Lab., Tokyo (Japan).
FULLY-THREE DIMENSIONAL FLOW FIELD ANALYSIS THROUGH TURBINE STATES: APPLICATIONS OF TIME MARCHING METHOD c34
Tatsuo Araki, Atsuhide Suzuki, and Tadashi Kobayashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 101-108 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A time marching method for the analysis of transonic fully-three dimensional flow in turbine stages is described. A reasonable numerical treatment at the flow boundary between stator and rotor is applied, and a rotating co-ordinate system is used for the expression of the rotor flow field. For solving the differential equations, Denton's scheme is adopted, which allows considerable computer time savings. The method developed was used to determine the flow through a transonic axial flow turbine stage with a significantly diverging flow passage, and it showed that the two dimensional analysis methods or the quasi-three dimensional methods which assume axisymmetry are not appropriate for evaluating these stages. Detailed measurements were carried out using an experimental air turbine, which confirmed the validity of the analysis method. Good agreement is obtained between the predicted and measured flow field. Author

N86-17281# National Aerospace Lab., Tokyo (Japan).
NUMERICAL FLOW ANALYSIS FOR AXIAL FLOW TURBINE c34
Tomohiko Sato and Sunao Aoki *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 109-118 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Some numerical flow analysis methods adopted in the gas turbine interactive design system, TDSYS, are described. In the TDSYS, a streamline curvature program for axisymmetric flows, quasi 3-D and fully 3-D time marching programs are used respectively for blade to blade flows and annular cascade flows. The streamline curvature method has some advantages in that it can include the effect of coolant mixing and choking flow conditions. Comparison of the experimental results with calculated results shows that the overall accuracy is determined more by the empirical correlations used for loss and deviation than by the numerical scheme. The time marching methods are the best choice for the analysis of turbine cascade flows because they can handle mixed subsonic-supersonic flows with automatic inclusion of shock waves in a single calculation. Some experimental results show that a time marching method can predict the airfoil surface Mach number distribution more accurately than a finite difference method. One weakpoint of the time marching methods is a long computer time; they usually require several times as much CPU time as other methods. But reductions in computer costs and improvements in numerical methods have made the quasi 3-D and fully 3-D time marching methods usable as design tools, and they are now used in TDSYS. Author

N86-17282# National Aerospace Lab., Tokyo (Japan).
AN EXPERIMENTAL STUDY OF PRESSURE DISTRIBUTIONS ON THE ENDWALLS IN A TRANSONIC ANNULAR NOZZLE CASCADE c02
Toshiyuki Takagi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 119-130 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Static pressure measurements on the endwalls of a nozzle cascade were made in a single stage, transonic axial-flow turbine with variable nozzles. Tests were conducted at two nozzle-offset-angles, where the theoretical exit Mach numbers were between 0.94 and 1.32. The test results were compared with the solutions of the inviscid, compressible, two-dimensional flow on a blade-to-blade stream surface through a single blade row. Static pressures on the endwalls near the suction-side of the nozzle vane were higher than the calculated values. However, near the pressure-side of the nozzle vane the measured values coincided well with the calculated values. At the throat section there were not many great discrepancies between the measured values and the calculated values. Minimum pressure occurred downstream from the throat section between the two nozzle vanes, and the location changed with exit flow conditions. Preiodicity of pressure distributions appeared downstream from the cascade and the exit flow was gradually uniform along the streamlines. Far downstream, the measured pressure distributions were in relatively good agreement with the calculated ones. Author

N86-17283# Fukui Univ. (Japan). Dept. of Mechanical Engineering.
NUMERICAL SIMULATION METHOD FOR COMBUSTION IN AN OXYHYDROGEN ROCKET MOTOR c20
Shiro Taki and Toshitaka Fuhwara (Nagoya Univ., Japan) *In* Natinal Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 131-140 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Numerical simulations of unsteady phenomena in the combustion chamber of an oxyhydrogen rocket motor were made in an attempt to develop a computer code for use in investigating such phenomena as vibrating combustion. The combustion in this system is controlled by diffusion, the effect of which works much slower than sound or pressure waves, so that diffusions are usually solved using the implicit finite difference method for unlimited time step size caused by stability criterion. However, the gases flow so fast, accompanied by unsteady pressure waves, that an explicit method is adopted to solve this problem. The way of modeling the turbulent diffusion combustion is very important in this simulation. The fine structures of turbulence and diffusion flame could not be calculated by a finite difference method because of the limited ability of computers. It is presumed that the size of the space difference should be less than or the same order as that of the small eddies. In the present example of simulation, eddy equations are not solved; rather the reasonable transport coefficients for small eddies are simply used. The results indicate the possibility of numerical

simulation of unsteady phenomena in an oxyhydrogen rocket motor, though it is till necessary to make comparisons with experiments to fix some parameters. Author

N86-17284# National Aerospace Lab., Tokyo (Japan).
A BASIC COMPUTER CODE FOR INDUSTRIAL BURNER DESIGNS. PART 1: CAPABILITY TEST IN ISOTHERMAL SWIRLING FLOWS **c61**
Kunihisa Eguchi and Shoichi Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 141-148 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The capability test of numerical simulation codes is described, focusing on the extensive comparison of LDV data and calculations in axisymmetric isothermal swirling flows which were created by a radial inflow air-swirler for use in a Stirling burner model. The numerical test suggests that as far as mean flow prediction is concerned, our computer code is adequate for Stirling burner design purpose. For further improvement in prediction accuracy of turbulence, the constants used in a standard two-equation turbulence model need to be modified for high temperature swirling flows with recirculation. Besides, additional source terms should be considered to deal with the effect of combustor geometries. Author

N86-17285# National Aerospace Lab., Tokyo (Japan).
INVESTIGATIONS ON EFFICIENT NUMERICAL METHOD FOR SUBSONIC LIFTING SURFACES **c02**
Shigenori Ando *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 149-162 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

This is an intermediate summary report on the numerical investigation of subsonic unsteady lifting surface. This work describes simple planar cases. Most of the results thus obtained would be fundamentally useful even for more complicated problems, such as non-planar wings or wings with finite thickness. The results are divided into the following three main parts: (1) introduction of error-index parameters E, and development of an adaptive numerical method for lifting surfaces. (2) Improvement of numerical calculation of the subsonic kernel function. (3) Development of new, accurate, fast-converging numerical methods for lifting surfaces. For two-dimensional airfoils a DLM-C method has been developed. For finite span wings a finite aerodynamic element method (DSM-CLS) and two pressure mode methods (NAM, NAS) have been developed. Author

N86-17286# Mitsubishi Electric Corp., Kamakura (Japan).
DEVELOPMENT OF SUBSONIC COMPUTATIONAL AERODYNAMIC PROGRAM USING PANEL METHOD **c02**
Ryujirou Kurosaki and Masayuki Katayama *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 165-174 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

This paper presents the Subsonic Computational Aerodynamic Program (SUSCAP) that was developed as an effective design tool to reduce the cost and time of wind tunnel tests. This code is based on a potential flow Panel Method coupled with a vortex-sheets renewal technique. The main function of the code is aerodynamic coefficient estimation of a three dimensional flying object. Other functions are also added, that is, velocity estimation at arbitrary points apart from the boundary surface, and high subsonic flow simulation by Prandtl-Glauert transformation. In order to investigate the usefulness of the code in designing aerodynamic shapes, this code is applied to a Wing-Boby-Tail configuration and a cruciform missile configuration. Their pressure distributions and roll moments are calculated. Calculated results are compared with the measured data, and the agreement is found satisfactory. Author

N86-17287# National Aerospace Lab., Tokyo (Japan).
IMAGE PROCESSOR ARCHITECTURES AND A DATA-DRIVEN IMAGE PROCESSORE: TIP-1 **c60**
Tsutomu Temma *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 175-182 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Many high speed image processors have been developed to date. In this paper, these processors are classified from the view point of parallel implemenon of identical processor elements and pipeline implementation with many types of processor elements. These processors are designed not only for high speed processing capabilities but also for compactness in hardware size. An image processor TIP-1 (Template-controlled Image Processor-1) was proposed and has been developed as progressive architecture for pipeline mechanisms. TIP-1 architecture is presented and an advanced system, TIP-3, using VLS1 chips, is proposed. Author

N86-17288# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL GRID GENERATION USING ALGEBRAIC AND GEOMETRICAL TECHNIQUES **c64**
Takuya Matsuda and Eiji Shima *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 183-190 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Two methods for numerical grid generation are presented in this paper: an algebraic method using Akima's interpolation technique and a geometrical method using the Dalaunay network. Since these methods require only a very short computing time compared to techniques based on partial differential equations, it is possible to generate grids interatively even with a small computer. The algebraic method uses bivariate interpolation based on local proceduce, and can be easily extended to three dimensional grid generation. The geometrical method is based on a procedure which draws contour maps for arbitrary distributed points using the Voronoi tessellation and the Delaunay network. An efficient algolism for the Voronoi tessellation is also presented. Author

N86-17289# Kyoto Inst. of Tech. (Japan).
NUMERICAL ANALYSIS FOR STEADY TRANSONIC FLOWS PAST AN AIRFOIL USING AF SCHEME **c02**
Nobuyuki Satofuka and Hidetoshi Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 193-200 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An approximate factorization scheme has been developed for analyzing transonic flows past an airfoil. In this scheme, upwind differencing is used for introducing artificial viscosity in the supersonic region and central differencing is used in the subsonic region. The resulting simple two- and three-banded matrices are solved by the relaxation procedure. This scheme is fully implicit, and in principle can be combined with the solution adaptive method. In both sub- and super-critical cases, the computed surface pressure distributions for an NACA0012 airfoil are in good agreement with those obtained by other methods. Author

N86-17290# Kyoto Inst. of Tech. (Japan).
NUMERICAL SOLUTION OF VISCOUS COMPRESSIBLE FLOWS PAST AN AIRFOIL USING UNCONDITIONALLY STABLE EXPLICIT METHOD **c02**
Nobuyuki Satofuka and Yuusuke Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 201-212 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An unconditionally stable explicit method has been applied to compute compressible laminar flows past an NACA0012 airfoil. The method is based on a combination of central differencing for spatial derivatives with a rational Runge-Kutta time integration

scheme. Both transonic (M = 0.8) and supersonic (M = 2.0) flow cases have been calculated for various Reynolds numbers. Physically plausible results are obtained for each case within practically feasible CPU time. Author

N86-17291# Nihon Univ., Tokyo (Japan). College of Science and Technology.
NUMERICAL ANALYSIS ABOUT FLOW OVER AN AEROFOIL WITH A LARGE ANGLE OF ATTACK c02
Kiyoaki Ono *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 213-220 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The results of numerical computations on the dynamic stall process of a two dimensional NACA0012 airfoil oscillating in pitch between 0 deg and 20 deg incidence angles are summarized. The uniform flow Mach number is set to 0.3. The Beam-Warming finite difference algorithm is applied to solve the time-averaged compressible Navier-Stokes, the laminar compressible Navier-Stokes and the Euler equations. The grid system is constructed based on a body-fitted curvilinear coordinate system for efficient unsteady flow computations. The computational results are compared with the experimental data. The process of the formation of the leading edge separation bubble, its convection along the airfoil surface and its shedding into the wake is fairly well simulated. But the abrupt drop of the lift coefficient is not detected in the computations. Judging from the pressure coefficient distribution, the Euler equations results give the best agreement with the experiment. It suggests that the effective local Reynolds number in the turbulent calculation is smaller than that in the actual flow field. A more precise estimation of the turbulence viscosity, the artificial one and the truncation error is necessary. Author

N86-17292# Nagoya Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL ANALYSIS OF TRANSONIC FLOW AROUND TWO-DIMENSIONAL AIRFOIL BY SOLVING NAVIER-STOKES EQUATIONS c02
Yi-Yun Wang and Toshi Fujiwara *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 221-228 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An effective finite-difference scheme for solving full compressible Navier-Stokes equations was initiated by Beam and Warming. The purpose of this paper is to develop that technique and apply it to the calculation of a typical subsonic or transonic, inviscid or viscous steady flow. First, the strong conservation-law form of the Navier-Stokes equations is written in Cartesian coordinates, and then transformed into a general grid system. Following the Beam-Warming difference scheme, the parameter combination delta=1/2 and theta=1 is generally adopted. After introducing spatial factorization, second-order dissipative terms are added to the left-hand side, while fourth-order terms are added to the right-hand side; the fourth-order smoothing terms are changed to second-order terms at points adjacent to the boundaries. The numerical computations were carried out only for a typical NACA 0012 airfoil. The calculations start from uniform free-stream variables throughout the flow field. The boundary conditions in the far field are free-stream. The following four cases are calculated: (1) M sub infinity = 0.63 and alpha=0, causing an entirely subsonic flow, (2) M sub infinity = 0.63 and alpha=2 degrees, the highest velocity of upper surface being close to sonic; (3) M sub infinity = 0.75 and alpha=0, when supersonic regions appear but there are no shock waves, and (4) M sub infinity = 0.75 and alpha=2 degrees, generating a shock wave over the upper flow field.
Author

N86-17293# National Aerospace Lab., Tokyo (Japan).
ANALYSIS OF HIGH REYNOLDS NUMBER TRANSONIC FLOW AROUND AN AIRFOIL c02
Nobuhiro Kawai and Naoki Hirose *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 229-234 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

High Reynolds number transonic flow around an airfoil is numerically analyzed. The implicit approximate factorization scheme is used for the Navier-Stokes equations with an algebraic eddy viscosity model of the turbulent boundary layer. The boundary conditions on the airfoil and along the wake cut are implicitly handled. Computed results of short bubble and shock-induced separation are demonstrated. Inviscid transonic flow around and airfoil is also numerically analyzed. The diagonal form of the implicit approximate factorization scheme is used for computational efficiency. Some of the results are compared with those of potential flow calculations. Author

N86-17294# National Aerospace Lab., Tokyo (Japan).
VALIDATION AND COMPARISON WITH EXPERIMENT OF A HIGH REYNOLDS NUMBER TRANSONIC FLOW AIRFOIL ANALYSIS CODE NSFOIL c02
Naoki Hirose, Nobuhiro Kawai, Keiko Oguchi, and Tomokazu Kodera *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 235-244 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Results of the two-dimensional Navier-Stokes code, NSFOIL, are compared with wnd tunnel data. Pressure distributions for various airfoil geometries are evaluated with special emphasis given to the NACA 0012 airfoil. Reynolds number values from 1.0 to 2.0 to the 7th power and Mach numbers from 0.7 to 2.0 are considered. M.G.

N86-17295# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
THE COMPARISON OF THE TRANSONIC AIRFOIL CALCULATION BY NSFOIL WITH THE WIND TUNNEL TEST DATA AT HIGH REYNOLDS NUMBER c02
Junichi Miyakawa and Naoki Hirose (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 245-254 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Over the past decade, the progress in computational aerodynamics has been so tremendous that it can be said that designers in aircraft industries have obtained a tool for aerodynamics analysis other than wind tunnel test, which had been their only tool since the invention of the aircraft. The new technology has become an even more efficient design tool with the development of computer aided design systems for interactive processing. All of the practical aerodynamics codes, however, are inviscid or boundary-layer-corrected programs which are accurate enough for analyzing attached flows but not for separated flows. Severe design trade off for recent high performance aircraft has necessitated accurate numerical analysis of viscous separated flows. The high Reynolds number transonic airfoil analysis code NSFOIL, is expected to be a good candidate for this difficult task. This paper presents the NSFOIL computation of the transonic flow past a supercritical airfoil, along with a comparison with the experiment to show the effectiveness of the new code. Author

N86-17296# Kawasaki Heavy Industries, Ltd., Akashi (Japan).
THE ROLE OF COMPUTATIONAL FLUID DYNAMICS IN AERONAUTICAL ENGINEERING c34
Takashi Uchida, Tadamasa Jyonouchi, Keisuke Sawada, and Tohru Nohisa *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 255-270 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
(Rept-2) Avail: NTIS HC A14/MF A01

The task of aircraft design often favors a robust, low-cost computational method rather than a sophisticated one. Examples of such engineering methods currently in use are described in this paper. Included are a viscous-inviscid coupling procedure for

a 2-D airfoil at high angle of attack in incompressible flow, a vortex-lattice procedure for not-so-slender wings, and extensions of the FLO22 code so as to incorporate the fuselage- and fluid-viscosity effects. Author

N86-17297# Fuji Heavy Industries Ltd., Utsunomiya (Japan).
APPLICATION OF COMPUTATIONAL AERODYNAMICS TO WING DESIGN c05
Masaaki Makadate *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 271-278 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Recent progress in Computational Aerodynamics has enabled the engineers of aircraft manufacturers to utilize transonic aerodynamic analysis programs in designing wings. Effectiveness of control surfaces (spoiler, aileron), which is greatly influenced by the characteristics of the wing, is an important problem. This paper introduces application of transonic aerodynamic analysis programs to the computation of control surface effectiveness. B.W.

N86-17298# National Aerospace Lab., Tokyo (Japan).
A NUMERICAL SOLUTION OF THE TRANSONIC INTEGRAL EQUATION AND ITS APPLICATION TO THREE-DIMENSIONAL TRANSONIC WIND DESIGN c05
Susumu Takanashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 279-292 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A numerical solution of the transonic integral equations is presented for three-dimensional transonic wing design. The objective of the design problem is to determine the wing geometry which realizes a prescribed pressure distribution on the wing surface. This boundary value problem can be formulated by the transonic integral equations with artificial viscosity terms. The resulting integral equations are simplified by introducing an approximate function for the space velocity distribution which reduces the three-dimensional problem to a two-dimensional one. The uniqueness of solution is guaranteed by imposing an additional condition, i.e., the closure condition at the trailing edge. To facilitate numerical evaluation of the definite integrals the wing surface is divided into a number of small rectangular panels. As a result, the singular integral equations are converted to a system of linear equations which can easily be solved by standard numerical techniques. An extension of the integral equation method to more general and versatile design procedure is described, and some of the design results for a transonic sweptback wing with an isobar pattern are also presented. Author

N86-17299# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
A WING DESIGN BASED ON THE THREE-DIMENSIONAL TRANSONIC INVERSE METHOD AND THE COMPARISON WITH THE WIND TUNNEL TESTING DATA c05
Shigefumi Tatsumi and Susumu Takanashi *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 293-304 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Along with the recent progress in computational aerodynamics, aircraft designers have paid great attention to inverse methods. Inverse methods, which determine wing geometries under prescribed target pressure distributions, are considered important design techniques because of the applicabilities of experience and knowledge of aircraft designers. Although several two-dimensional methods have already been established, there exist only a few reports about three-dimensional transonic inverse methods, and the three-dimensional technique has not been established yet. This report describes wing design by the three-dimensional transonic inverse method using the integral equation formulation which was developed by one of the authors. The method has the great advantage that various flow-solvers can be applied. Also wind tunnel testing was conducted with the design wing to investigate the capability of the method. The comparison of design and test results shows a good agreement and the method proves to be very effective in three-dimensional transonic wind design. Author

N86-17300# Nihon Univ., Tokyo (Japan).
THE ANALYSIS OF PRACTICAL TRANSONIC SWEPT WINGS WITH AND WITHOUT BOUNDARY LAYER EFFECTS c02
Koji Komatsu, Eiji Iida, Ryuma Kawamura, Naoki Hirose (National Aerospace Lab., Tokyo, Japan), and Kenichi Matsuno (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 305-312 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A comparison of the result of numerical analysis with experimental data is made for the ONERA M-6 and the practical transonic wing model 720211. The Jameson-Caughey's transonic wing programs FLO22 and FLO27 are used. The wing aerodynamic characteristics with viscous effect are evaluated by taking into account the boundary layer friction drag. This drag is calculated by using a three-dimensional compressible boundary layer program for wings, BLAY. Finally, a viscous-inviscid interaction procedure for FLO27-BLAY is proposed, and a preliminary result is presented. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-17301 North Carolina State Univ., Raleigh.
NUMERICAL AND EXPERIMENTAL INVESTIGATION OF FORCED LAMINAR FREE SHEAR LAYERS AND TURBULENT SLOT INJECTION FLOWS Ph.D. Thesis
Roy Mitchel McInville 1985 132 p
Avail: Univ. Microfilms Order No. DA8518266

A compact finite-difference scheme is applied to the complete form of the governing conservation equations for a two-dimensional laminar mixing layer. The ability of this computational approach to model successfully the formation and interaction of the large scale vortical structures which dominate such flow fields is verified in the present study. Parameters which affect the spread rate of the mixing region are identified. Detailed investigation of the momentum transport processed associated with the large scales combined with an assessment of the relative magnitude of viscous effects indicates that the vortex interactions are essentially inviscid phenomena. Experimental investigations of turbulent slot injection flows indicate the ineffectiveness of conventional mixing layer control techniques for such configurations. The well-developed incoming turbulent boundary layer proves to be the dominating factor and only by altering its structure can changes be induced in the downstream evolution of the flow. Author

N86-17302 Cincinnati Univ., Ohio.
A STUDY OF HIGH REYNOLDS NUMBER LAMINAR SEPARATION Ph.D. Thesis
Alric Paul Rothmayer 1985 414 p
Avail: Univ. Microfilms Order No. DA8518150

Modern asymptotic theories of high Reynolds number viscous flows are integrated with the interacting boundary layer formulation in order to study both large and small scale laminar separation for two-dimensional incompressible viscous flows. An extension of a previously developed asymptotic theory is used to study the initial cross-over from massive separation to an attached flow in a single row unstaggered cascade. Analytic solutions are developed for the limit of small cascade spacing. From the analytic solutions

several interesting features of the cascade are examined; including multiple-solution branches and multiple regions of stall hysteresis. Viscous solution techniques based on the interacting boundary layer approach are then sought in order to calculate the flows described by the asymptotic theories. The classical Hilbert integral form of the interacting boundary layer equations are formulated and solved for small scale separation over thin single airfoils and cascades of airfoils. Author

N86-17303 Oregon State Univ., Corvallis.
WIND TURBULENCE INPUT MODEL FOR HORIZONTAL AXIS WIND TURBINES Ph.D. Thesis
Shuh-Ren Lin 1985 135 p
Avail: Univ. Microfilms Order No. DA8518607

In order to estimate wind turbine response characteristics in the presence of atmospheric turbulence, the important atmospheric sources for the force excitations felt by the wind turbine system must be identified and characterized. The goal of this research is to develop the wind turbulence input model for horizontal axis wind turbines. The wind turbulence inputs are determined in three basic modeling steps. First, the turbulent velocity field is assumed to be stationary, locally homogeneous, isotropic, and satisfying Taylor's frozen field hypothesis. The Von Karman model is used to characterize the correlation between velocity components at different spatial positions and at different times. In the second step, the spatial variation of the turbulence is approximated by a few terms in a series expansion. Here, uniform terms across the rotor disk, gradient terms which vary linearly across the disk, and terms which vary quadratically across the disk are retained. In the third step, the correlation of these turbulent velocity terms can be closely approximated by low order linear systems forced by white noise. Dissert. Abstr.

N86-17304 Lehigh Univ., Bethlehem, Pa.
VORTEX FORMATION FROM BLUFF AND THIN TRAILING-EDGES: THE INITIAL INSTABILITY Ph.D. Thesis
Mehmet Fevzi Unal 1985 202 p
Avail: Univ. Microfilms Order No. DA8516263

Instabilities from blunt and thin trailing-ends/edges are investigated. Particular attention is given to the formation of the large-scale vortex and its evolution in the region immediately downstream of the separation surface. Also of interest is the effect of an upstream influence from downstream edge, i.e., wedge, on the evolution of vortices from the separation surface. In this context, wakes from thin-trailing edges in presence of a downstream edge provide a reference case; when compared with wakes from bluff bodies, it reveals the physical grounds for relative insensitivity of bluff body wakes to upstream influence of downstream wake-edge interaction. In investigating these flows, several experimental techniques are employed: velocity measurements in the near-separation and near-wake regions; surface pressure measurements in the wake-edge interaction region; and flow visualization of the entire flow domain. Large-scale vortex formation from a bluff body, for example, a circular cylinder and/or a flat plate with a blunt trailing-end, over a tenfold range of Reynolds number, $440 < \text{or} = Re < \text{or} = 5040$, arises from exponential amplification, to varying degrees, of the unstable shear layer separating from the body. Author

N86-17305 Engineering Sciences Data Unit, London (England).
ESTIMATION OF DRAG DUE TO INOPERATIVE TURBO-JET AND TURBO-FAN ENGINES USING DATA ITEM NOS. 81009 AND 84004
Jul. 1984 12 p Submitted for publication
(ESDU-84005; ISBN-0-85679-467-8; ISSN-0141-4054) Avail: ESDU

ESDU 84005 illustrates how data on windmilling drag and airflow and on spillage drag are used to predict the drag due to the inoperative engine. The data are respectively taken from ESDU 81009 and ESDU 84004, but other sources could be used. Where ESDU data are used the method is particular suited to cases where the particular engine, or intake, data are not available. Author

N86-17306 Royal Aircraft Establishment, Farnborough (England).
RECENT EXPERIENCE IN THE RAE 5 METER WIND TUNNEL OF A CHINA CLAY METHOD FOR INDICATING BOUNDARY LAYER TRANSITION
I. R. M. Moir 14 Aug. 1984 11 p refs
(RAE-TM-AERO-2007; BR94478) Avail: NTIS HC A02/MF A01

A flow visualization method using clay to study boundary layer transition on a slender body model at high Reynolds number in a pressurized, low speed wind tunnel is described. The method is based on the differential rate of evaporation, beneath laminar and turbulent boundary layers, of a liquid absorbed on a solid spread on the surface. The liquid has a similar refractive index to the solid so that the mixture appears to be transparent until evaporation takes place, when the color of the solid becomes visible. The solid layer consists of china clay powder mixture with chemicals to form a lacquer, which is sprayed on to the surface. When dry, this forms a semipermanent white absorbent film. A liquid sprayed on this film is absorbed by it, causing it to become transparent. The lacquer consists of Frigilene (100 ml), butyl acetate (100 ml), butyl alcohol (100 ml), xylene (50 ml), and china clay (100 mg). Author (ESA)

N86-17307 Royal Aircraft Establishment, Farnborough (England).
STUDIES OF THE FLOW FIELD NEAR A NACA 4412 AEROFOIL AT NEARLY MAXIMUM LIFT
R. C. Hastings and B. R. Williams 20 Dec. 1984 35 p refs
(RAE-TM-AERO-2026; BR96009) Avail: NTIS HC A03/MF A01

Measurements at Mach number 0.18 and chord-based Reynolds number 4.2 million on a constant-chord model having a NACA 4412 airfoil are compared with the results of flow field calculations. The measurements include static pressure distributions on the wing surface and on the wind tunnel walls above and below the mid-span section of the wing. The development of the upper surface boundary layer through separation (at 20% chord ahead of the trailing-edge) and on into the wake, was studied using laser anemometry. The flow field calculations are of the semi-inverse kind in which an inverse momentum-integral treatment of the shear flow, used to avoid difficulties at separation, is coupled to a direct solution of the inviscid flow problem. Results reveal the importance of shear flow in altering the disturbance introduced into the free stream by the airfoil. Measure and predictions agree well. Author (ESA)

N86-17308# National Aerospace Lab., Tokyo (Japan).
ESTIMATION OF DIVERGENCE AND FLUTTER BOUNDARIES ON SUPERSONIC PLATE WING MODELS FROM SUBCRITICAL RANDOM RESPONSES DUE TO AIR TURBULENCE
Yasukatsu Ando, Yuji Matsuzaki, Hiroshi Ejiri, and Takao Kikuchi 1985 17 p refs In JAPANESE; ENGLISH summary
(NAL-TR-856; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The National Aerospace Laboratory (NAL) method was applied to the response data which were obtained from subcritical flutter and divergence tests conducted in the NAL supersonic wind tunnel. Backward- and forward-swept wing models were used for the flutter and divergence tests, respectively. The stationary sampled time responses were modeled by both the autoregressive moving average (ARMA) and autoregressive (AR) processes. It has been shown that both flutter annd divergence boundaries in a supersonic flow range can well be estimated as those in the transonic flow region. Author

N86-17309# Royal Aircraft Establishment, Farnborough (England).
A RAPID METHOD FOR ESTIMATING EQUIVALENT PARABOLIC POLARS FROM WIND-TUNNEL TESTS
D. E. Lean and S. P. Fiddes 15 Apr. 1985 19 p refs
(RAE-TM-AERO-2034; BR96601) Avail: NTIS HC A03/MF A01

A method for obtaining a best fit parabolic drag polar from measured force results is presented. The method is used in estimating the blockage correction due to separated flow that must be applied to wind tunnel results. The method uses computer graphics to identify the part of the measured drag polar that may best be described by a parabola, and thus used as the basis for a curve fit. The method is fast, when compared to existing curve

fitting techniques, and suited to use with an on line data reduction system. Author (ESA)

N86-17310# Sandia National Labs., Albuquerque, N. Mex.
INTRODUCTION TO DEPLOYABLE RECOVERY SYSTEMS
J. Meyer Aug. 1985 31 p
(Contract DE-AC04-76DP-00789)
(DE86-000048; SAND-85-1180) Avail: NTIS HC A03/MF A01

This report provides an introduction to deployable recovery systems for persons with little or no background in parachutes but who are knowledgeable in aerodynamics. A historical review of parachute development is given along with a description of the basic components of most deployable recovery systems. Descriptions are given of the function of each component and of problems that occur if a component fails to perform adequately. Models are presented for deployable recovery systems. Possible directions for future work are suggested in the summary. DOE

N86-17311# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
INVERSE METHOD WITH GEOMETRY CONSTRAINTS FOR TRANSONIC AIRFOIL DESIGN
J. M. J. Fray, J. W. Slooff, J. W. Boerstoel, and A. Kassies 3 Jul. 1984 27 p refs Presented at International Conference on Inverse Design Concepts in Engineering Science (ICIDES), Austin, Tex., Oct. 1984
(NLR-MP-84069-U; B8568525) Avail: NTIS HC A02/MF A01

An engineering method for the design of airfoils having a prescribed pressure distribution in subsonic or transonic flow is described. The method is based on an iterative procedure of residual-correction type. In each iteration step, the difference between a current and a target pressure distribution (residual) is determined by a fast (multigrid) finite volume full-potential code. Corrections to the geometry driving the pressure residual to zero are determined by a global, inverse, thin airfoil theory based method for the subsonic part of the flow field, and by a local, inverse wavy-wall theory based formula for the supersonic part of the flow field. The determination of the geometry correction is formulated as a minimization problem, in that pressure distribution and geometry requirements may be balanced in a weighted least squares sense. The capabilities of the method are illustrated by examples of airfoil designs. Author (ESA)

N86-17312# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
COMMENT ON THE YAW STABILITY OF A HORIZONTAL-AXIS WIND TURBINE AT SMALL ANGLES OF YAW
O. deVries 13 Sep. 1984 20 p refs Submitted for publication
(NPL-MP-84084-U; B8568527) Avail: NTIS HC A02/MF A01

Small-scale wind tunnel experiments on a wind turbine model revealed stable yawing moments at almost all operating conditions with the rotor in an upwind position with respect to the tower. It is shown that this positive yaw stability can be explained, at least at small angles of yaw, by the frozen vortex wake concept. Author (ESA)

N86-17313# Technische Hogeschool, Twente (Netherlands). Windmill Group.
SCALE MODEL OF THE SWD 5000 LW ROTOR WIND TUNNEL TESTS FOR DIFFERENT BLADE SETTING ANGLES
C. A. Busker Nov. 1983 26 p refs
(WM-074) Avail: NTIS HC A03/MF A01

The wind tunnel performance of a 1:3.33 scale model of the SWD 5000 LW windpowered pump rotor for different blade angle settings is described. Results are given as power and torque curves, and optimum blade angles with respect to maximum power and torque at startup were assessed. Results show that extension of the blades towards the center does not increase the starting torque. Author (ESA)

N86-17314# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
LOW SPEED AERODYNAMIC CHARACTERISTICS OF A TWO-DIMENSIONAL SAIL WING WITH ADJUSTABLE SLACK OF THE SAIL
R. G. denBoer 1984 38 p refs
(VTH-LR-307) Avail: NTIS HC A03/MF A01

Low speed aerodynamic characteristics of a very simple dacron airfoil were investigated in a low speed, low turbulence wind tunnel. The influence of the slack of the sail on the lift coefficient ci, drag coefficient cd, and cl/cd, was studied. Measurements were performed at chord Reynolds numbers 200,000, 300,000, and 500,000 at values of the angle of attack and slack of the sail where relatively high values of the ratio cl/cd occurred. Results show that the value (cl/cd)max of the airfoil exceeds the value (cl/cd)max of a similar configuration in which a rigid circular plate of 10% camber is used instead of a sail. Author (ESA)

N86-17315# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
SUBSONIC UNSTEADY AEROELASTICITY: THE POTENTIAL METHOD APPLIED TO LIFTING SURFACES Final Report [AEROELASTICITE INSTATIONNAIRE SUBSONIQUE. METHODE DU POTENTIEL POUR DES SURFACES PORTANTES]
J. P. Grisval and J. J. Angelini Apr. 1985 64 p refs In FRENCH
(Contract DRET-84-95-006)
(ONERA-RT-21/3064-RY-045-R) Avail: NTIS HC A04/MF A01

A method to compute the unsteady pressure distribution created by the harmonic vibration of a body in translation through a compressible fluid is presented. The method is based on the integral equation linking the wall perturbation potential to surface displacement in the subsonic domain. The theoretical expansion of this method to the lifting surface case is presented. Numerical results obtained for bodies with a wake are satisfactory. Application to complex bodies, taking element interaction into account is discussed. Author (ESA)

N86-17316# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
TRANSONIC WIND TUNNEL TESTS OF A SWEPT SUPERCRITICAL WING-BODY MODEL, PT 8 Final Report
Lars Torngren Feb. 1985 110 p ref
(Contracts FMV-F-K-82223-75-007-07-001;
FMV-F-K-82223-76-001-21-001; FMV-F-K-82223-80-001-21-001)
(FFA-TN-1982-24) Avail: NTIS HC A06/MF A01

Wind tunnel tests were carried out in the Mach number range 0.5 to 0.99 on a swept wing-body model. The investigation comprises six-component balance measurements, wing pressure measurements, and flow visualization. Wings with and without strakes, but with the same quarter-chord sweep of 35 deg were tested on a cylindrical and an area ruled body. Pressure measurements were only done on the wing with strakes. For the model with this wing, the effects of underwing and wingtip mounted stores were also studied. Author (ESA)

N86-17317# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
AN EXPERIMENTAL INVESTIGATION OF SUPERSONIC FLOW OVER AXISYMMETRIC AFTERBODIES WITH A CENTERED PROPULSIVE JET AT ANGLES OF ATTACK
Johan Agrell Mar. 1985 94 p refs
(Contracts FMV-F-K-84302-73-042-07-001;
FMV-F-K-82223-76-001-21-001)
(FFA-TN-1985-10) Avail: NTIS HC A05/MF A01

A wind tunnel investigation of the influence of angle of attack on the flow over 5 after-bodies equipped with an axisymmetric centered propulsive jet with a Mach number of 2.5 was made. The test was performed at Mach numbers 2.0 and 3.0 at angles of attack of 0, 3, 6, 10, and 15 deg. The jet pressure was high enough to force the flow to separate from the afterbody surface. Pressure measurement, Schlieren photography, and oil flow tests were used. The boundary layer was measured at 0, 3, and 6 deg angles of attack. The flow separation can be studied from the

pressure distribution and oil flow and Schlieren photographs.
Author (ESA)

N86-17318# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
A WIND TUNNEL INVESTIGATION OF THE EFFECT OF A PROPULSIVE JET ON CONTROLS LOCATED ON A CONICAL AFTERBODY IN SUBSONIC AND SUPERSONIC FREE STREAMS
Johan Agrell Apr. 1985 80 p refs
(Contracts FMV-F-K-81713-75-038-07-001; FMV-F-K-82223-76-001-21-001)
(FFA-TN-1985-11) Avail: NTIS HC A05/MF A01

The effect of a propulsive jet on controls located at two different positions on an afterbody was studied in a wind tunnel. The test was performed at Mach number 0.7, 0.9, 1.3, and 2.0 at angle of attack 9 deg. The controls were set at deflection angles 0, 10, and -10 deg. The jet pressure was high enough to influence the flow over the afterbody. Controls at the forward location are more loaded than the rear located ones, and they are less influenced by the jet. The influence of the jet tends to decrease the loads of the controls with increasing jet pressure ratio. Author (ESA)

N86-17319# Politecnico di Torino (Italy). Dipt. di Ingegneria Aeronautica e Spaziale.
RESULTS FOR ANALYTICAL TRANSONIC FLOW PATTERNS WITH WEAK SHOCK WAVES OVER CURVED WALLS WITH A CORNER
Gianfranco Chiocchia Jun. 1985 70 p refs
(STN-9) Avail: NTIS HC A04/MF A01

Numerical tables and diagrams for two dimensional transonic flow patterns are presented to provide test cases for computer programs. The flows are streams along curved walls presenting a slope discontinuity. The shock wave arises at the discontinuity point and was constructed through a procedure resting only on the irrotationality assumption. By considering weak shock waves, this assumption leads to negligeable errors, the amounts of which are also reckoned. The analytical relations describing the flows are outlined. Author (ESA)

N86-17320# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
APPLICATION OF A CONSTRAINED INVERSE METHOD IN THE AERODYNAMIC DESIGN OF A LOW SPEED WING-SLAT CONFIGURATION
J. A. vanEgmond, B. vandenBerg, and Th. E. Labrujere 30 Sep. 1983 36 p refs
(Contract NIVR-1901)
(NLR-TR-83123-U; B8569027) Avail: NTIS HC A03/MF A01

A system for computational design of multielement airfoils was developed. It solves the inverse aerodynamic problem in an approximate way. A priori specified aerodynamic requirements and geometric requirements are minimized in a least squares way, introducing weight factors to emphasize locally aerodynamic or geometric requirements. The system was applied to a wing with slat, exhibiting unfavorable drag characteristics. The design focused on the wing nose geometry at the slat intersection. To improve the drag characteristics a target pressure distribution was defined with a reduced suction level on the wing nose. The computations indicated that this target could be achieved with satisfactory approxiation (fulfilling at the same time a set of geometry requirements). This is confirmed by wind tunnel measurements. The tests also show a substantial drag reduction. Author (ESA)

N86-17321# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A SYSTEM FOR COMPUTER AIDED ANALYSIS AND DESIGN OF MULTIELEMENT AIRFOILS: MAD
Th. E. Labrujere 9 Oct. 1983 33 p refs
(Contracts NIVR-1819; NIVR-1944)
(NLR-TR-83136-U; B8569026) Avail: NTIS HC A03/MF A01

A program system for interactive analysis and design of multielement airfoils in incompressible viscous flow was developed. It applies three computational methods, one for the analysis of viscous flow, one for the analysis of inviscid flow around multielement airfoils, and one for the design of multielement airfoils in inviscid flow. The latter two methods are described. Features of the design method are illustrated by numerical results.
Author (ESA)

N86-17322# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A THEORETICAL EXPLORATION OF THE CAPABILITIES OF 2D FLEXIBLE WALL TEST SECTIONS FOR 3D TESTING
J. Smith 29 Feb. 1984 26 p refs
(NLR-MP-84018-U; B8569024) Avail: NTIS HC A03/MF A01

The applicability of two dimensional flexible solid wall test sections for three dimensional testing is theoretically investigated for linearized subsonic flow. The method uses known interference velocity distributions along a target line (derived from a method of images for this particular study). From these, wall shapes are calculated that reduce or eliminate the axial gradients of wall-induced upwash and blockage along this target line. The examples of residual wall interference presented show that these gradients, as well as the overall blockage level, can substantially be reduced by acceptable wall displacements and test section lengths, even for half model testing. Author (ESA)

N86-17323# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A SURVEY OF COMPUTATIONAL METHODS FOR SUBSONIC AND TRANSONIC AERODYNAMIC DESIGN
J. W. Slooff 3 Jul. 1984 71 p refs Presented at International Conference on Inverse Design Concepts in Engineering Science (ICIDES), Austin, Tex., Oct. 1984
(NLR-MP-84066-U; B8569320) Avail: NTIS HC A04/MF A01

Computational methods for finding the detailed shape of (parts of) configurations of which the gross geometric characteristics are already determined in a preliminary, overall design process, and that, subject to constraints, have to meet given aerodynamic requirements, are reviewed. Methods for solving the classical inverse problem of aerodynamics and approaches using optimization techniques are emphasized. Methods limited to subsonic flow utilizing panel method technology, and methods based on finite difference/volume formulations for compressible, transonic flow are covered. The merits of the various computational approaches to the problem of aerodynamic design are compared.
Author (ESA)

N86-17268# Chiba Univ. (Japan).
SUPERSONIC FLOW ON AXISYMMETRIC BLUNT BODY
Nobuhide Nishikawa, Riichi Sakuma, and Yukihiko Inoue *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 1-8 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17271# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF THE LEADING-EDGE SEPARATION VORTEX OVER DELTA WING
Kozo Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 27-34 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17272# Tsukuba Univ. (Japan).
CURRENT STATUS OF RESEARCH ON EVOLUTION OF LONGITUDINAL VORTICES IN WALL TURBULENCE
Shunichi Tsuge and Hiroshi Sakai *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 35-42 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17273# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF UNSTEADY FLOW AROUND AN AIRFOIL BY FINITE DIFFERENCE SOLUTION OF NAVIER-STOKES EQUATIONS
Satoru Ogawa and Tomiko Ishiguro *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 43-52 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17276# Tokyo Univ. (Japan). Dept. of Applied Physics.
DIRECT SIMULATION OF THE INCOMPRESSIBLE FLOW AT HIGH REYNOLDS NUMBER BY FINITE DIFFERENCE METHOD
Tetuya Kawamura *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 67-76 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17278# Metropolitan Coll. of Technology, Tokyo (Japan).
TRANSONIC INTERNAL FLOW ABOUT AN AIRFOIL OSCILLATING IN PITCH: COMPARISONS BETWEEN COMPUTATION AND EXPERIMENT
Toshimasa Shiratori and Yoshimichi Tanida (Tokyo Univ., Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 85-90 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17279# National Aerospace Lab., Tokyo (Japan).
NUMERICAL ANALYSIS OF FULLY THREE-DIMENSIONAL FLOW IN TRANSONIC TURBINE CASCADES
Masahiko Koya and Susumu Kotake *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 91-100 refs In JAPANESE; ENGLISH summary Original language document was announced in IAA as A84-46886 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17282# National Aerospace Lab., Tokyo (Japan).
AN EXPERIMENTAL STUDY OF PRESSURE DISTRIBUTIONS ON THE ENDWALLS IN A TRANSONIC ANNULAR NOZZLE CASCADE
Toshiyuki Takagi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 119-130 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17285# National Aerospace Lab., Tokyo (Japan).
INVESTIGATIONS ON EFFICIENT NUMERICAL METHOD FOR SUBSONIC LIFTING SURFACES
Shigenori Ando *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 149-162 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17286# Mitsubishi Electric Corp., Kamakura (Japan).
DEVELOPMENT OF SUBSONIC COMPUTATIONAL AERODYNAMIC PROGRAM USING PANEL METHOD
Ryujirou Kurosaki and Masayuki Katayama *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 165-174 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17289# Kyoto Inst. of Tech. (Japan).
NUMERICAL ANALYSIS FOR STEADY TRANSONIC FLOWS PAST AN AIRFOIL USING AF SCHEME
Nobuyuki Satofuka and Hidetoshi Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 193-200 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17290# Kyoto Inst. of Tech. (Japan).
NUMERICAL SOLUTION OF VISCOUS COMPRESSIBLE FLOWS PAST AN AIRFOIL USING UNCONDITIONALLY STABLE EXPLICIT METHOD
Nobuyuki Satofuka and Yuusuke Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 201-212 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17291# Nihon Univ., Tokyo (Japan). College of Science and Technology.
NUMERICAL ANALYSIS ABOUT FLOW OVER AN AEROFOIL WITH A LARGE ANGLE OF ATTACK
Kiyoaki Ono *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 213-220 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17292# Nagoya Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL ANALYSIS OF TRANSONIC FLOW AROUND TWO-DIMENSIONAL AIRFOIL BY SOLVING NAVIER-STOKES EQUATIONS
Yi-Yun Wang and Toshi Fujiwara *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 221-228 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17293# National Aerospace Lab., Tokyo (Japan).
ANALYSIS OF HIGH REYNOLDS NUMBER TRANSONIC FLOW AROUND AN AIRFOIL
Nobuhiro Kawai and Naoki Hirose *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 229-234 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17294# National Aerospace Lab., Tokyo (Japan).
VALIDATION AND COMPARISON WITH EXPERIMENT OF A HIGH REYNOLDS NUMBER TRANSONIC FLOW AIRFOIL ANALYSIS CODE NSFOIL
Naoki Hirose, Nobuhiro Kawai, Keiko Oguchi, and Tomokazu Kodera *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 235-244 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17295# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
THE COMPARISON OF THE TRANSONIC AIRFOIL CALCULATION BY NSFOIL WITH THE WIND TUNNEL TEST DATA AT HIGH REYNOLDS NUMBER
Junichi Miyakawa and Naoki Hirose (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 245-254 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17300# Nihon Univ., Tokyo (Japan).
THE ANALYSIS OF PRACTICAL TRANSONIC SWEPT WINGS WITH AND WITHOUT BOUNDARY LAYER EFFECTS
Koji Komatsu, Eiji Iida, Ryuma Kawamura, Naoki Hirose (National Aerospace Lab., Tokyo, Japan), and Kenichi Matsuno (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 305-312 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-17324# Committee on Science and Technology (U. S. House).
CONTROLLED IMPACT DEMONSTRATION (CID)
Washington GPO 1985 82 p Hearing before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 13, 2 Apr. 1985
(GPO-46-870) Avail: Subcommittee on Transportation, Aviation and Materials

A congressional hearing was conducted and expert testimony presented on the controlled impact demonstration. The experimental worth of crashing an airplane for the purpose of gaining hard data on crashworthiness was discussed. G.L.C.

N86-17325# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
HARDWARE/SOFTWARE FAILURE MODE EFFECT ANALYSIS (FMEA) APPLIED TO AIRPLANE SAFETY
J. B. J. vanBaal 31 Jul. 1984 9 p refs Presented at 1985 Annual Reliability and Maintainability, Philadelphia, Pa., 22-24 Jan. 1985
(NLR-MP-84073-U; B8568107) Avail: NTIS HC A02/MF A01

A systematic, analytical methodology for aircraft system safety assessment is explained. A try-out on a software controlled digital avionics system is summarized. Analysis of software components is emphasized. It is concluded that the same methodology can be applied to software and hardware. Conditions that have to be met to perform a successful hardware/software safety assessment are described. Author (ESA)

N86-17326# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany). Abt. Verkehr.
[ACTIVITIES REPORT FOR THE WEST GERMAN CIVIL AIRPORTS. PART 1: TEXT] Annual Report, 1984 [VERKEHRSLEISTUNGEN DER DEUTSCHEN VERKEHRSFLUGHAEFEN. 1: TEXT]
1984 63 p refs In GERMAN
(ISBN-3-87977-056-5-Pt-1) Avail: NTIS HC A04/MF A01

The 1984 statistics on the transport performance of West German international and regional airports and landing sites, including West Berlin, and of Austrian and Swiss airports are presented. Statistics on aircraft movements in line, charter, and group travel operations, on the number of passengers, on regional traffic, as well as airpost and freight traffic are collected. A statistical comparison regarding transport performance between West German airports and other European airports is made. Author (ESA)

N86-17327# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany). Abt. Verkehr.
[ACTIVITIES REPORT FOR THE WEST GERMAN CIVIL AIRPORTS. PART 2: TABLES] Annual Report, 1984 [VERKEHRSLEISTUNGEN DER DEUTSCHEN VERKEHRSFLUGHAEFEN. 2: TABELLEN]
1984 81 p In GERMAN
(ISBN-3-87977-056-5-Pt-2) Avail: NTIS HC A04/MF A01

Tables for aircraft movements, commercial passenger traffic, freight traffic, and individual and total traffic of West German airports in 1984, as well as for regional transport airports and landing sites, for Austrian airports, and for Zurich and Basel airports are presented. Charts for air traffic long term development of West German international airports, for monthly distribution, and for the twelve-monthly change rate of passenger number are shown. Author (ESA)

N86-17328# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
THE DEICED SUPER PUMA
J.-P. Silvani 1985 10 p refs Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-104) Avail: NTIS HC A02/MF A01

The efficiency of helicopter ice protection systems was studied in flight test with natural icing conditions, in icing wind tunnel tests and analytically. The icing wind tunnel tests were intended to develop and validate air intake and horizontal stabilizer icing protections. Proper operation of all protections is verified in natural icing flight down to -20 C in continuous and intermittent icing conditions. Author (ESA)

N86-17329# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
SEARCH AND RESCUE (SAR) SYSTEM DEVELOPED AS PART OF THE CONTRACT SIGNED WITH THE IRISH AIR CORPS FOR THE SUPPLY OF 365 F DAUPHIN AIRCRAFT
S. Rioche 1985 15 p Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-105) Avail: NTIS HC A02/MF A01

A helicopter-borne search and rescue system, including a fully automatic guiding function and an electronic flight instrument system was developed. The first includes automatic search patterns and descent to hovering near the designated target, implemented by a navigation computer and a flight director computer. The second includes a display of horizontal situation parameters, attitude and radar. The versatility of the system makes it compatible with a wide variety of other requirements, both civil and military. Author (ESA)

N86-17330# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
SYSTEMS SAFETY: PHANTOM OR REALITY [SECURITE DES SYSTEMES: FANTOME OU REALITE]
Pierre Lavedrine 1985 10 p In FRENCH Presented at 3rd Seminaire Europeen sur la Securite des Systemes, Cannes, France, 19-21 Sep. 1984
(SNIAS-852-422-103) Avail: NTIS HC A02/MF A01

The juridical aspects of manufacturer's liability in case of safety failure, particularly in the case of aircraft accidents, are discussed. The moral aspects and responsibilities of designers are examined. Author (ESA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-17331 Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
[ACTIVITIES IN AIR TRAFFIC CONTROL] Annual Report, 1984
Jun. 1985 50 p In GERMAN
Copyright. Avail: Issuing Activity

Measures to enhance air traffic safety and regularity, performance of air traffic services, operational problems, and air traffic incidents are discussed. Navigation and radiotelephony techniques, information transmission techniques, radar techniques, and air traffic control technical services are described. Activities of the office for passenger information, flight measurements, construction plans, education and advanced training, and cooperation in the framework of international aviation organization are summarized. Author (ESA)

N86-17332# Racal-Decca Ltd., Chessington (England). New Business and Advanced Development Div.

STUDY OF USER SEGMENT OF NAVSAT Final Report
R. Allan, P. Diederich, A. K. Johnston, A. Haddrell, J. E. Rowntree, S. S. D. Jones, and P. A. Matthews (Leeds Univ.) Paris ESA 1985 340 p refs
(Contract ESA-5231/82/F-RD(SC))
(ESA-CR(P)-2089) Avail: NTIS HC A15/MF A01

The Navsat civil satellite navigation system TDMA concept was assessed, the signal structure was refined, and methods of implementing receiver designs to serve as many classes of user as possible were considered. Applications and limitations of the system are discussed, and receiver and processing methods for air, marine, and land users are proposed. The proposed TDMA format is retained, while modifying the contents of each burst to assist a wider user base and to provide an accuracy/cost alternative to users. Each burst consists of a CW component, spread spectrum component, and application data component, transmitted simultaneously. The CW accuracy (150 to 200 m) is satisfactory for many users, but can be improved by using the spread spectrum to measure range distance to the satellites. Author (ESA)

N86-17333# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Traegheitsortung und Navigation.
CONSTRUCTION OF A MEASURING METHOD USING FIBER OPTICS AND AN LTN-90 LASER GYRO STRAPDOWN SYSTEM FOR BO-195 HELICOPTERS
Hans-Juergen Hotop and Hans-Peter Zenz May 1985 48 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-85-10; ISSN-0176-7739) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 19

A Modular Universal Data Acquisition System 2 (MUDAS 2) equipped with an LTN-90 laser gyro strapdown navigation system and with a fiber optic data bus for transmission of ARINC-429 signals was developed for onboard testing of navigation systems. It was tested on a BO-105 helicopter during flights for applicability on helicopters and flexibility in data acquisition and recording. The system was studied on long distance flights and on strong maneuver flights. Signals of the LTN-90 system were compared with the data of the Precision Automated Tracking System laser radar. Application of fiber optics for data transmission of bit serial signals (200 Hz NRZ Code) is proved. The LTN-90 navigation system designed for surface aircraft can be applied without loss of accuracy. Author (ESA)

N86-17334# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
A SOPHISTICATED TRACKING ALGORITHM FOR AIR TRAFFIC CONTROL (ATC) SURVEILLANCE RADAR DATA
H. A. P. Blom 9 Jan. 1984 10 p refs Presented at International Conference on Radar, Paris, France, 21-24 May 1984
(NLR-MP-84004-U; B8566260) Avail: NTIS HC A02/MF A01

An algorithm based on martingale tools for application to sudden aircraft maneuvers in radar tracking was developed. It is a Markov jump-diffusion model. It provides very accurate state estimates during unchanged flight modes, very fast reaction and convergence after changes, and good estimates of its own accuracy. Comparison with an alpha-beta tracker, a Kalman based tracker, and a state-of-the-art tracker proves the superior performance of the algorithm. Author (ESA)

N86-17335# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
COMPARISON OF A JUMP-DIFFUSION TRACKER WITH A KALMAN TRACKER: AN EVALUATION WITH EMPHASIS ON AIR TRAFFIC CONTROL
H. A. P. Blom 30 Mar. 1983 39 p refs
(NLR-TR-83063-U; B8569022) Avail: NTIS HC A03/MF A01

Radar tracking algorithms are compared. A probabilistic approach to the tracking problem is a Markov jump-diffusion model for the aircraft dynamics, its control, and the radar measurements. From nonlinear filtering theory, a closed form description of the evolution of the conditional distribution of this Markov process can be obtained. This jump-diffusion filter, however, is infinite dimensional and approximations are necessary for algorithmic implementation. The indirect approach of approximating the jump-diffusion by a diffusion leads to a Kalman-like tracker. The approach of approximating the jump-diffusion filter directly leads to a bank of interacting Kalman-like trackers. Comparison for air traffic control shows that the jump-diffusion tracker performs considerably better than the Kalman tracker. Author (ESA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.
For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-17336 Royal Aircraft Establishment, Farnborough (England).
STANDARDISED FATIGUE LOADING SEQUENCES FOR HELICOPTER ROTORS (HELIX AND FELIX). PART 1: BACKGROUND AND FATIGUE EVALUATION
P. R. Edwards, comp. and J. Darts, comp. 14 Aug. 1984 115 p refs 2 Vol.
(RAE-TR-84084; RAE-Mat/Struct-101-Pt-1; ICAF-1442-Pt-1; NLR-TR-84043-U-Pt-1; LBF-FB-167-Pt-1; IABG-TF-1425-Pt-1; BR95787) Avail: NTIS HC A06/MF A01

The background of the Helix and Felix standard loading sequences for the main rotors of helicopters with articulated and semirigid rotors respectively is outlined. The loading standards provide a convenient tool for providing fatigue data under realistic loading, which can immediately be compared with other data, and can be used to provide design data. Helix and Felix statistical content according to different counting methods and the results of fatigue tests used to assess them are presented. Author (ESA)

N86-17337 Royal Aircraft Establishment, Farnborough (England).
STANDARDISED FATIGUE LOADING SEQUENCES FOR HELICOPTER ROTORS (HELIX AND FELIX). PART 2: FINAL DEFINITION OF HELIX AND FELIX
P. R. Edwards, comp. and J. Darts, comp. 14 Aug. 1984 122 p refs 2 Vol.
(RAE-TR-84085; RAE-Mat/Struct-100-Pt-2; ICAF-1442-Pt-2; NLR-TR-84043-U-Pt-2; LBF-FB-167-Pt-2; IABG-TF-1425-Pt-2; BR95846) Avail: NTIS HC A06/MF A01

Full length and shortened versions of the Helix and Felix standard loading sequences for rotors of helicopters with articulated and semirigid rotors respectively are presented. The standards provide a convenient tool for providing fatigue data under realistic loading, which can immediately be compared with other data, and can be used to provide design data. The method of generation is extremely simple, although a considerable amount of data is required for the generation algorithm. A FORTRAN program and complete data tables in the correct format are given. Author (ESA)

N86-17338*# National Aeronautics and Space Administration, Washington, D.C.
AERODYNAMIC DESIGN TRENDS FOR COMMERCIAL AIRCRAFT
R. Hilbig and H. Koerner Jan. 1986 54 p refs Transl. into ENGLISH of conference paper "Aerodynamische Entwicklungsrichtungen fuer Verkehrsflugzeuge" rept. DGLR-84-082 presented at the German Aerospace Society Annual Convention, 1984 p 1-53 Convention held in Hamburg, West Germany, 1-3 Oct. 1984 Original language document was announced in IAA as A85-40302 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77976; NAS 1.15:77976) Avail: NTIS HC A04/MF A01 CSCL 01C

Recent research on advanced-configuration commercial aircraft at DFVLR is surveyed, with a focus on aerodynamic approaches to improved performance. Topics examined include transonic wings with variable camber or shock/boundary-layer control, wings with

reduced friction drag or laminarized flow, prop-fan propulsion, and unusual configurations or wing profiles. Drawings, diagrams, and graphs of predicted performance are provided, and the need for extensive development efforts using powerful computer facilities, high-speed and low-speed wind tunnels, and flight tests of models (mounted on specially designed carrier aircraft) is indicated. T.K.

N86-17339# Societe Nationale des Poudres et Explosifs, Vert-Le-Petit (France). Centre de Recherches du Bouchet.
FLEXIBLE INTERMEDIATE FILM WITH A LARGE TEMPERATURE RANGE FOR AERONAUTICAL UTILIZATION Final Report [FILM INTERCALAIRE SOUPLE A LARGE DOMAINE DE TEMPERATURE D'UTILISATION POUR L'AERONAUTIQUE]
Jacky Pattein 8 Jul. 1985 21 p In FRENCH
(Contract DRET-83-129)
Avail: NTIS HC A02/MF A01

Transparent polyurethane film was produced in order to obtain improved properties for stratified windshield manufacturing. The evaluation was carried out using 50 m of 40 cm wide film. A better flexibility, better behavior at low temperatures and better adhesion on glass are verified. The properties are superior to equivalent materials used for the same purpose. Author (ESA)

N86-17340# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
CRITICAL ANALYSIS OF TURBULENCE RESTITUTION FROM ACCELERATION MEASUREMENTS [ANALYSE CRITIQUE DE LA RESTITUTION DE LA TURBULENCE A PARTIR DE MESURES D'ACCELERATION]
G. Coupry Jan. 1985 34 p refs In FRENCH
(Contract STPA-84-95015)
(ONERA-RT-3/3567-RY-C40-R) Avail: NTIS HC A03/MF A01

Civil aircraft acceleration data were collected for an atmospheric turbulence data bank. Differences observed among the different types of aircraft are analyzed. The error analysis shows that these differences are not related to turbulence scale. However, the coefficients used to compute turbulence from acceleration appear inadequate. The Poisson statistical law is confirmed as suitable to describe turbulence distribution. Author (ESA)

N86-17341# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany). Buero der Nachrichten fuer Luftfahrer.
ENVIRONMENT-FRIENDLY PROPELLER AIRCRAFT WITH A MAXIMUM WEIGHT OF 5700 kg, AND MOTOR GLIDERS: PUBLICATION OF THE NOISE VALUES [UMWELTFREUNDLICHE PROPELLERFLUGZEUGE BIS 5700 KG HOECHSTMASSE UND MOTORSEGLER: VEROEFFENTLICHUNG DER LAERMWERTE]
31 Oct. 1983 25 p In GERMAN
Avail: NTIS HC A02/MF A01

The noise values (status October 31, 1983) of all prototypes and series of propeller aircrafts and motor gliders fulfilling the standard MfLII-47/75 or the noise protection requirements for aircraft LSL (April 23, 1981) are listed. Equipment, maximum permissible cruising power, maximum permissible number of revolutions, initial mass, temperature corrected noise level, power correction value, certified noise level, and noise threshold are given. Author (ESA)

N86-17342# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
DAMAGE-TOLERANT AIRCRAFT DESIGN
H. P. vanLeeuwen 23 Jan. 1984 30 p refs Presented at 5th European Conference on Fracture, Lisbon, Portugal, 17-21 Sep. 1984
(NLR-MP-84005-U; B8568522) Avail: NTIS HC A03/MF A01

Actions to be taken to realize a damage-tolerant aircraft structure and to have it certified are listed. Studies to define aircraft usage, missions; develop load spectra, sequences; select critical locations for an evaluation; develop stress spectra for those locations; determine environmental conditions for those locations; compile crack growth data for each material and environment; compile fracture toughness data; produce crack growth curves; determine residual strength; decide on inspection techniques; determine detectable crack length; and decide on inspection intervals are summarized. Full scale tests on an F-28 aircraft wing are described. Author (ESA)

N86-17343# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
HELICOPTER-SHIP QUALIFICATION TESTING
R. Fang, T. J. Hoekstra, and C. F. G. M. Hofman 18 Jun. 1984 19 p Submitted for publication
(NLR-MP-84062-U; B8568102) Avail: NTIS HC A02/MF A01

Helicopter-ship qualification tests are reviewed. The total program comprises wind-tunnel tests on a scale model of the ship, full scale wind climate tests on board the ship, shore-based helicopter flight tests in the low speed region, and helicopter flight tests on board the ship. The program leads to a safe and optimum operational availability of the helicopter on board the ship in terms of take-off, landing and deck handling capabilities as a function of relative wind and sea-state. Author (ESA)

N86-17344# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN AND FABRICATION OF AN ADVANCED COMPOSITE CELLULAR WING BOX
G. Romeo (Polytecnico di Torino, Italy) and W. H. M. vanDreumel 1984 23 p refs
(VTH-LR-315) Avail: NTIS HC A02/MF A01

A cellular integral structure was designed for the upper and lower panels of a wing box in order to realize a ribless structure. A small panel was manufactured and tested under uniaxial compression. A wing box (length 1300mm) was manufactured. Author (ESA)

N86-17345# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
LECTURE NOTES ON FATIGUE, STATIC TENSILE STRENGTH AND STRESS CORROSION OF AIRCRAFT MATERIALS AND STRUCTURES. PART 2: FIGURES
J. Schijve Aug. 1983 121 p refs
(VTH-LR-360-Pt-2; B8563474) Avail: NTIS HC A06/MF A01

Graphs, photographs, and figures from a report on aircraft materials and structures tests are presented. Author (ESA)

N86-17346# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
OPERATIONAL APPLICATION OF THE STALINS METHOD FOR MEASURING TAKE-OFF AND LANDING TRAJECTORIES
C. G. Kranenburg, A. Pool, and A. J. L. Willekens 15 Apr. 1983 55 p refs Revised
(Contract NIVR-1899)
(NLR-TR-83010-U; B8569023) Avail: NTIS HC A04/MF A01

The STALINS method to calculate the trajectories from the outputs of an inertial sensing system is described and compared with results obtained from onboard cameras and a radio altimeter from 200 takeoff and landing flight tests. The comparison shows that the STALINS method is at least as accurate as the other methods and meets its design goals. Author (ESA)

N86-17347# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
THREE-DIMENSIONAL FLIGHT-PATH RECONSTRUCTION BY MEANS OF SPLINE APPROXIMATION
M. R. Best 30 Jul. 1985 67 p refs
(Contract NIVR-1816)
(NLR-TR-83091-U; B8568391) Avail: NTIS HC A04/MF A01

A method to reconstruct the flight path of a symmetric flight, by representing this path by a set of splines, was applied to a three-dimensional flight over a rotating Earth. Results are comparable in accuracy and computing time to the Kalman (square root information) smoother, but reduction in computing time seems feasible. Author (ESA)

N86-17348# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
ESTIMATION OF LOAD EXCEEDANCES OF AN AIRCRAFT UNDER CARRIAGE WITH NONLINEAR PROPERTIES EXCITED BY RANDOM RUNWAY UNEVENNESS
R. Noback 20 Mar. 1984 94 p refs
(Contract NIVR-1947)
(NLR-TR-84030-U; B8568529) Avail: NTIS HC A05/MF A01

Methods to describe a landing gear with nonlinear properties excited by random runway unevenness during taxiing were investigated. Calculations were compared to measured results from an analog computer simulation. The mean behavior, standard deviations, and power spectra can be described with a classic type of equivalent gain. Load exceedance curves can be approximated fairly well with conditional equivalent gains that depend on the output load level. Author (ESA)

N86-17349# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
OPTIMIZATION IN DESIGN PROCESSES: AN INFORMATICS POINT OF VIEW
R. F. vandenDam, J. W. Boerstoel, and H. A. M. Daniels 3 Aug. 1984 33 p refs Presented at International Conference on Inverse Design Concepts in Engineering Science (ICIDES), Austin, Tex., Oct. 1984 Submitted for publication
(NLR-MP-84074-U; B8569324) Avail: NTIS HC A03/MF A01

Optimization system development and the potential of mathematical optimization techniques in aeronautical engineering are discussed. The main requirements to be met by a general-purpose optimization system are given. Implementation is described, and examples of applications are presented. Author (ESA)

N86-17350# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
STRATEGIES FOR DYNAMIC MODELING OF A HELICOPTER STRUCTURE
Serge Durand and Victor Yana 1985 12 p refs Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-101) Avail: NTIS HC A02/MF A01

Helicopter dynamic modeling problems are studied using three principles: divide difficulties, correlate with test and simplify reality. The analytical procedures that were used include the finite element method, modal analysis, harmonic analysis and transient analysis. The method is applied to the tail section of the Ecureil helicopter. Good correlation between natural frequency modes as measured and calculated is obtained over nine vibrating modes. The forced response calculations allowed to find a solution to a problem of unbalance excitation caused by the tail rotor. Author (ESA)

N86-17269# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
AN INTERACTIVE DESIGN SYSTEM FOR WINGED SPACE VEHICLE
Yoshifumi Inatani, Takashi Abe, Haruo Hosokawa (Japan Information Service, LTD), and Jun Sakamoto (Japan Information Service, LTD) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 9-16 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17297# Fuji Heavy Industries Ltd., Utsunomiya (Japan).
APPLICATION OF COMPUTATIONAL AERODYNAMICS TO WING DESIGN
Masaaki Mekadate *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 271-278 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17298# National Aerospace Lab., Tokyo (Japan).
A NUMERICAL SOLUTION OF THE TRANSONIC INTEGRAL EQUATION AND ITS APPLICATION TO THREE-DIMENSIONAL TRANSONIC WING DESIGN
Susumu Takanashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 279-292 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17299# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
A WING DESIGN BASED ON THE THREE-DIMENSIONAL TRANSONIC INVERSE METHOD AND THE COMPARISON WITH THE WIND TUNNEL TESTING DATA
Shigefumi Tatsumi and Susumu Takanashi *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 293-304 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-17351*# Illinois Univ., Urbana-Champaign. Computer Systems Group.
ERROR PROPAGATION IN A DIGITAL AVIONIC PROCESSOR: A SIMULATION-BASED STUDY
D. Lomelino and R. K. Iyer [1986] 39 p refs
(Grant NAG1-613)
(NASA-CR-176501; NAS 1.26:176501) Avail: NTIS HC A03/MF A01 CSCL 01D

An experimental analysis to study error propagation from the gate to the chip level is described. The target system is the CPU in the Bendix BDX-930, an avionic miniprocessor. Error activity data for the study was collected via a gate-level simulation. A family of distributions to characterize the error propagation, both within the chip and at the pins, was then generated. Based on these distributions, measures of error propagation and severity were defined. The analysis quantifies the dependency of the measured error propagation on the location of the fault and the type of instruction/microinstruction executed. Author

N86-17352# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
THE APPLICATION OF SENSORS IN LIGHT TESTS
S. Storm vanLeeuwen 16 May 1984 12 p refs Presented at 2nd S and A Symposium, Enschede, Netherlands, 1-2 Nov. 1984
(NLR-MP-84056-U; B8568098) Avail: NTIS HC A02/MF A01

Evaluation of transducers used in flight test data collection systems is described. Needs for flight test transducers are discussed. Static laboratory tests, duration tests, environmental tests, and tests in laboratory aircraft are outlined. Pressure, temperature, position, acceleration, vibration, and sound transducers, and gyros are covered. Author (ESA)

N86-17353# Kollsman System-Technik G.m.b.H., Munich (West Germany).
DEVELOPMENT OF A PIEZOELECTRIC QUARTZ PRESSURE SENSOR FOR AVIONICS WITH EXCELLENT LONG TERM STABILITY (WITH FINAL DEMONSTRATION OF THE RESULTS ON A PROTOTYPE) Final Report, Nov. 1984
Matthias R. Risch Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-W-85-010; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

An accurate, stable pressure sensor was developed for avionics using quartz as a pressure-sensitive element, a copper-

beryllium beam balance for pressure transfer, calculators for digitization, and two identical high frequency piezoelectric surface wave resonators for improved accuracy. Sensor pressure and temperature dependence were tested. Pressure sensitivity changes with temperature, at 0.05% per C. As errors are < 0.1% for hysteresis, repeatibility, temperature hysteresis, and long term drift, the pressure sensor can be mass produced. Nonlinearity and temperature dependence are 1% but can be compensated with a microprocessor. Author (ESA)

N86-17354# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
RELIABILITY ASPECTS OF SOFTWARE FOR DIGITAL AVIONICS
G. J. Dekker 1985 95 p refs Revised
(Contract RB-RLB-1982-1-3.3)
(NLR-TR-82126-U; B8568394) Avail: NTIS HC A05/MF A01

Methods to develop reliable software based avionics systems, especially for safety critical functions, are reviewed. The differences between analog and digital systems, and the policy of the FAA to certify software based systems are presented. Methods to minimize the number of errors during software development, methods to remove as many errors as possible via testing, and methods to minimize the effect of remaining errors during operational flights are outlined. A safety analysis regarding common-mode failures is given. Reliability related techniques used by avionics manufacturers are discussed. Author (ESA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-17355# Washington Univ., St. Louis, Mo. School of Engineering and Applied Science.
EFFECT OF DYNAMIC STALL AND ELASTIC PARAMETERS ON THE FUNDAMENTAL MECHANISMS OF HELICOPTER VIBRATIONS Final Report, 1 Sep. 1983 - 31 Aug. 1985
D. A. Peters 1 Sep. 1985 11 p
(Contract DAAG29-83-K-0133)
(AD-A160022; ARO-20538.3-EG) Avail: NTIS HC A02/MF A01 CSCL 20/11

This research dealt with the modeling and solution of rotary-wing dynamics. In the modeling area, it deals with elastic-blade models, ways to introduce rotor-body coupling, aerodynamic behavior near blade-tips, and the modeling of dynamic stall. In solution strategies, we have concentrated on new and improved Floquet methods, on innovative trim methodologies (such as auto-pilot and periodic shooting), on efficient formulation of equations, and on lifting-line and lifting-surface meshes. GRA

N86-17356# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
MODELS AND IDENTIFICATION OF MATERIALS UNDER ONE AXE AND TWO AXES STRESS Final Report [MODELISATION ET IDENTIFICATION DES MATERIAUX SOUS SOLLICITATIONS UNIAXIALES ET MULTIAXIALES]
J. L. Chaboche, D. Nouailhas, D. Pacou, H. Policella, and S. Savalle Mar. 1985 62 p refs In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-54/1765-RY-044-R) Avail: NTIS HC A04/MF A01

Research in turbomachine blade design and life study is presented. Plastic and viscoplastic multiaxial behavior analysis is used in development of computer programs, particularly with the INC0718 high temperature alloy. A tensile and torsion test facility is adapted to work in the 500 to 700C temperature range. The adaptation includes high frequency induction heating and a capacitive linear and angular deformation measurement device. Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-17357 Engineering Sciences Data Unit, London (England).
ESTIMATION OF SIDEFORCE, YAWING MOMENT AND ROLLING MOMENT DERIVATIVES DUE TO RATE OF YAW FOR COMPLETE AIRCRAFT AT SUBSONIC SPEEDS
Apr. 1984 52 p refs Submitted for publication
(ESDU-84002; ISBN-0-85679-463-5; ISSN-0141-397X) Avail: ESDU

ESDU 84002 demonstrates how methods given elsewhere in the Sub-series for estimating the contributions to the derivatives Y sub r, N sub r and L sub r due to individual major parts of the airframe (wing, bodies, flaps and fin) may be combined to provide values for the complete aircraft. The overall accuracy achieved is illustrated by correlation plots showing comparison of prediction with flight test and wind tunnel results drawn from many sources in the literature; for a diverse range of configurations broadly Y sub r is predicted within 0.05, N sub r within 0.025 and L sub r within 0.02. A simplified method for estimating complete aircraft yawing derivative values is also included. Author

N86-17358*# Kansas Univ., Lawrence. Flight Research Lab.
DEVELOPMENT OF A SENSITIVITY ANALYSIS TECHNIQUE FOR MULTILOOP FLIGHT CONTROL SYSTEMS Final Report
Alfredo Herrera Vaillard, James Paduano, and David R. Downing Oct. 1985 162 p refs
(Contract NCC2-293)
(NASA-CR-166619; NAS 1.26:166619) Avail: NTIS HC A08/MF A01 CSCL 01C

This report presents the development and application of a sensitivity analysis technique for multiloop flight control systems. This analysis yields very useful information on the sensitivity of the relative-stability criteria of the control system, with variations or uncertainties in the system and controller elements. The sensitivity analysis technique developed is based on the computation of the singular values and singular-value gradients of a feedback-control system. The method is applicable to single-input/single-output as well as multiloop continuous-control systems. Application to sampled-data systems is also explored. The sensitivity analysis technique was applied to a continuous yaw/roll damper stability augmentation system of a typical business jet, and the results show that the analysis is very useful in determining the system elements which have the largest effect on the relative stability of the closed-loop system. As a secondary product of the research reported here, the relative stability criteria based on the concept of singular values were explored. B.W.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-17359*# Wyle Labs., Inc., Hampton, Va.
OPERATIONAL CONSIDERATIONS IN MONITORING OXYGEN LEVELS AT THE NATIONAL TRANSONIC FACILITY
M. A. Zalenski, E. L. Rowe, and J. R. McPhee Washington Dec.

1985 19 p
(Contract NAS1-16331)
(NASA-CR-3953; NAS 1.26:3953) Avail: NTIS HC A02/MF A01 CSCL 14B

Laboratory monitoring of the level of oxygen in sample gas mixtures is a process which can be performed with accurate and repeatable results. Operations at the National Transonic Facility require the storage and pumping of large volumes of liquid nitrogen. To protect against the possibility of a fault resulting in a localized oxygen deficient atmosphere, the facility is equipped with a monitoring system with an array of sensors. During the early operational stages, the system produced recurrent alarms, none of which could be traced to a true oxygen deficiency. A thorough analysis of the system was undertaken with primary emphasis placed on the sensor units. These units sense the partial pressure of oxygen which, after signal conditioning, is presented as a % by volume indication at the system output. It was determined that many of the problems experienced were due to a lack of proper accounting for the partial pressure/% by volume relationship, with a secondary cause being premature sensor failure. Procedures were established to consider atmospherically induced partial pressure variations. Sensor rebuilding techniques were examined, and those elements contributing to premature sensor failure were identified. The system now operates with a high degree of confidence and reliability. Author

N86-17360# Kema (N. V.), Arnhem (Netherlands). High Voltage Lab.
THE DESIGN OF SHIELDED ENCLOSURES, ESPECIALLY FOR HIGH-VOLTAGE LABORATORIES
P. C. T. vanderLaan (Technical Univ., Eindhoven, Netherlands), W. J. L. Jansen, E. F. Steennis, and A. J. vanLoon, ed. 1984 14 p refs
(S/T-Rept-Vol-2-No-11; ISBN-90-353-0022-X; ISSN-0167-8590; B8564312) Avail: NTIS HC A02/MF A01

It is argued that a shielded enclosure acts as a complicated receiving antenna for incoming electromagnetic waves, so it is incorrect to model an enclosure as a flat metallic sheet of infinite extent, as is done in the traveling wave concept to calculate shielding effectiveness. The field method and the circuit method are more useful calculation models, because they are based on currents circulating around the entire volume enclosed. The field method gives correct values, but is rather complicated. The circuit method offers more insight into the shielding mechanism, especially at low frequencies. The required attenuation is found by considering measuring circuits for the detection of partial discharges. The resulting attenuation is not only a matter of a correct choice of wall material and thickness, but also depends on the construction of doors and joints, and on filtering of the electrical supply.
Author (ESA)

N86-17270# National Aerospace Lab., Tokyo (Japan).
RAREFIED GAS NUMERICAL WIND TUNNEL: MONTE CARLO SIMULATION
Katsuhisa Koura *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 17-27 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-17361# Royal Norwegian Council for Scientific and Industrial Research, Blindern. Space Activity Div.
[ACTIVITIES REPORT IN SPACE RESEARCH IN NORWAY] Annual Report, 1984
Arne Gundersen and Ann-Lisbeth Ruud Holtet 1984 56 p refs Original contains color illustrations
(SAD-125-T; ISBN-82-7224-091-2) Avail: NTIS HC A04/MF A01

Space physics, astrophysics, and life science research, and space-related test facilities are described. Spaceborne, rocket-borne, balloon-borne, and ground based experiments are summarized. Space plasmas; ERS-1 radar; auroras; the ionosphere; satellite imagery; stellar UV spectra; flare star photometry; stellar atmospheres; solar activity; IUE data; and gravity effects on plants are studied. Author (ESA)

N86-17362# MATRA Espace, Toulouse (France). Instrumentation Div.
BIO-OBSERVATION SUBSYSTEM (BOSS) FEASIBILITY STUDY Final Report
Paris ESA 24 Aug. 1984 64 p
(Contract ESA-5801/83/F-FC(SC))
(BOSS-010-MT; ESA-CR(P)-2083) Avail: NTIS HC A04/MF A01

The feasibility study on the Bio-Observation Subsystem (BOSS) planned for the second flight of the Spacelab Biorack as part of the microgravity program is summarized. A very centralized concept where BOSS replaces an incubator and allows use of video cameras connected to telemetry downlink for real time operations, film camera for transient phenomena recording, and a near-standard microscope is selected. An alternative concept to solve operational problems of the baseline design is also presented. The development plan is outlined. The feasibility of BOSS is demonstrated, and a design which meets essential objectives and minimizes impact on Biorack is proposed. Author (ESA)

N86-17363# Swedish Space Corp., Solna.
UTILIZATION OF THE SWEDISH EXPERIMENT MODULE WITHIN THE TEXUS 9/10 FLIGHT OPPORTUNITY Final Report
Rolf Joensson Paris ESA 19 Nov. 1984 62 p refs
(Contract ESA-5854/84/F-HEW)
(M5/7-14; ESA-CR(P)-2085) Avail: NTIS HC A04/MF A01

A module containing a high temperature mirror furnace (HTMF), a crystal growth facility (CGF), and a gradient furnaces assembly (GFA) was flown in the TEXUS 10 sounding rocket. Particle composites in alloys with high melting points; zone melting of germanium crystals; retention of a fine precipitate dispersion by gravity solidification; and directional solidification of Sn-Al alloys were studied. With the HTMF, both samples melted, revealing uniform distribution of tungsten particles in an Fe-Ni matrix. However, the isothermal treatment above the melting point had a shorter duration than expected due to the thermal overload of the payload. For the CGF, both samples melted. The floating zone experiments give substantial results on the mechanisms predominant in a liquid during zero-g conditions. For the GFA, one of three samples was processed under microgravity. Splitting the module into a HTMF-module with larger power and thermal capacity, and a calm module with CGF and GFA is recommended. Author (ESA)

N86-17364# Officine Galileo S.p.A., Florence (Italy). Space Activity Div.
BIO-OBSERVATION SUBSYSTEM, PHASE A STUDY, EXECUTIVE SUMMARY Final Report
G. Borghi, A. Mariani, and E. Nocentini Paris ESA Sep. 1984 42 p Revised
(Contract ESTEC-5802/83/F-FC(SC))
(Rept-648-DT-6-Issue-1; ESA-CR(P)-2081) Avail: NTIS HC A03/MF A01

A Spacelab system for observing biological effects of the space environment with low magnification for, e.g., small plants and insects, and high magnification for, e.g., human cells and bacteria, was defined. For the macroscopic system, an automatic photographic camera with a dedicated timer circuit to select time intervals is proposed. For microscopic observations, a video camera with dedicated recorder and direct link to the ground, and a cine camera without downlink are suggested. Fiber optics illuminators are recommended. Both systems can be integrated in the Biorack incubator. Author (ESA)

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-17417*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RADIATION EXPOSURE AND PERFORMANCE OF MULTIPLE BURN LEO-GEO ORBIT TRANSFER TRAJECTORIES
Sol H. Gorland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 383-389 refs Previously announced as N85-21228 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-17365# SATCOM International, Paris (France).
COMPARISON OF SPACE SEGMENTS FOR THE PROVISION OF FUTURE DATA RELAY SATELLITE SERVICES Executive Summary
P. Molette, P. SaintAubert, S. Gabriel (BAe), M. Marsili (Selenia Spazio), E. Saggese (Telespazio), and M. Langemann (Dornier) Paris ESA 15 Aug. 1984 30 p 2 Vol.
(Contract ESA-1571/83/NL-DG)
(SATCOM-092/PSA/AB/173/84-Vol-1; ESA-CR(P)-2066-Vol-1)
Avail: NTIS HC A03/MF A01

A European data relay satellite system was defined after studying user requirements and technological possibilities. The first generation system consists of 2 satellites in orbit (1 nominal, 1 spare used for peak demands), at 10 W and 5 E. They are medium class spacecraft platforms (1500 to 1750 kg at launch on Ariane). The recommended payload configuration includes a feeder link to the control station (no dissemination to user), a large S + Ka antenna for S and K band single access (2 channels), 2 small (0.9 m) antennas for 5 band multiple access. A small Ka antenna for medium data rate users may be added, but its real need requires further investigation. The second generation consists of 3 spacecraft in orbit located at 50 W, 5 E (spare used for peak loads) and 65 E. Author (ESA)

N86-17366# SATCOM International, Paris (France).
COMPARISON OF SPACE SEGMENTS FOR THE PROVISION OF FUTURE DATA RELAY SATELLITE SERVICES Final Report
P. Molette, P. SaintAubert, M. Chabrol, E. Millon, J. C. Flandrin, J. Boissieres, T. Duhamel, B. Tedaldi, R. Young (BAe), S. Gabriel (BAe) Aircraft Group) et al Paris ESA 15 Aug. 1984 296 p 2 Vol.
(Contract ESA-1-1571/83/NL-DG)
(SATCOM-092/PSA/AB/173/84-Vol-2; ESA-CR(P)-2066-Vol-2)
Avail: NTIS HC A13/MF A01

A European data relay satellite system was defined after studying user requirements and technological possibilities. The first generation system consists of 2 satellites in orbit (1 nominal, 1 spare used for peak demands), at 10 W and 5 E. They are medium class spacecraft platforms (1500 to 1750 kg at launch on Ariane). The recommended payload configuration includes a feeder link to the control station (no dissemination to user), a large S + Ka antenna for S and K band single access (2 channels), 2 small (0.9 m) antennas for 5 band multiple access. A small Ka antenna for medium data rate users may be added, but its real need requires further investigation. The second generation consists of 3 spacecraft in orbit located at 50 W, 5 E (spare used for peak loads) and 65 E. Author (ESA)

N86-17403# Martin Marietta Aerospace, New Orleans, La.
SHUTTLE DERIVED UNMANNED LAUNCH VEHICLE
D. N. Buell and J. R. Tewell *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 229-236 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/2

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-17367# Committee on Science and Technology (U. S. House).
RESULTS OF SPACE SHUTTLE FLIGHT 51-A
Washington GPO 1985 24 p Hearing before the Committee on Science and Technology, 99th Congress, 1st Session, no. 7, 30 Jan. 1985
(GPO-44-770) Avail: Committee on Science and Technology

The Committee on Science and Technology of the U.S. House of Representatives met on 30 Jan. 1985 to discuss the results of Space Shuttle flight 51-A. Speaking for the Committee were Don Fuqua (Florida), Chairman, and Manual Lujan, Jr. (N. Mexico) and Ron Packard (California), members. Representing the Shuttle crew were Capt. (USN) Frederick Hauck, flight commander, accompanied by Commander (USN) David Walker, mission pilot, and Dr. Joseph Allen, Dr. Anna Fisher, and Dale Gardner, mission specialists. The successful 8-day mission was highlighted by two atellite deployments and two satellite retrievals. An equally important accomplishment as the attempt to grow organic crystals in a weightless environment. F.M.R.

N86-17409# Department of Transportation, Washington, D. C. Office of Commercial Space Transportation.
REGULATORY ASPECTS OF COMMERCIAL, SPACE TRANSPORTATION
H. R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 291-297 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/1

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-17368*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

MMIC ANTENNA TECHNOLOGY DEVELOPMENT IN THE 30/20 GIGAHERTZ BAND
J. Smetana, T. J. Kascak, and R. E. Alexovich 1986 22 p refs Proposed for presentation at 11th Annual Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by AIAA
(NASA-TM-87192; E-2848; NAS 1.15:87192) Avail: NTIS HC A02/MF A01 CSCL 09F

This paper presents a progress summary of NASA's efforts in developing 20 and 30 GHz GaAs MMIC devices and an advanced satellite communications antenna system using these devices. In the interest of preserving resources such as frequency spectrum and orbital space the antenna system is being developed with multiple fixed spot beams and multiple scanning spot beams. NASA set high goals for the MMIC development to pushc GaAs technology. These goals and the main features of the MMIC devices are discussed. Some packaging and characterization considerations are also discussed. The 20 GHz transmit antenna and 30 GHz receive antenna are being developed separately. The approach selected is to perform contractual configuration studies, purchase a 20-GHz experimental antenna system (EAS) and perform in-house evaluation. The features and key specifications of the EAS are discussed. Additional supporting technologies such as effects of coupling on modest sized arrays, MMIC matching techniques, in-house analytical capability, wideband and dual frequency microstrip patch array development, and MMIC packaging techniques are described. Some plans for future are also discussed. Author

N86-17369# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
LOCAL NETWORK INTERCONNECTION THROUGH A SATELLITE POINT TO MULTIPOINT LINK Ph.D. Thesis [INTERCONNEXION DE RESEAU LOCAUX A TRAVERS UNE LIAISON SATELLITE POINT-A-MULTIPOINT]
Otto Carlos MunizBandeiraDuarte 8 Jul. 1985 211 p refs In FRENCH
(ENST-85E007; ISSN-0751-1353) Avail: NTIS HC A10/MF A01

Four architectures to implement a point to multipoint satellite link protocol for communication services offered by the Telecom 1 satellite network are presented. A safe communication service with error correction and flow control facilities is described. It is shown that a time transparent communication system combines simplicity and cost advantages. Author (ESA)

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-17370*# National Aeronautics and Space Administration, Washington, D.C.
X-RAY SATELLITE Status Report, third quarter 1985
Dec. 1985 49 p Transl. into ENGLISH of "Roentgen Satellit Statusbericht; 3 Quartal" rept. DFVLR-WE2/9143 DFVLR, Cologne, West Germany, 30 Sep. 1985 p 1-72 Transl. by The Corporate Word, Ind., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77997; NAS 1.15:77997; DFVLR-WE2/9143) Avail: NTIS HC A03/MF A01 CSCL 22B

The 3rd Quarter Status Report on DFVLR's ROSAT project confirms that with regard to technical performance and costs the project is on schedule. The valid schedule for engineering model and flight model completion on May 7, 1985 leads to a launch date on October 30, 1987. Progress in each department is compared to and explained with regard to the milestone plan. Continued problems with the gold damping of the FM-mirror system and contamination of the sterile rooms where the mirrors are stored have led to postponement of milestone 7. It is not yet completely clear to what extent all successive milestones will be affected by this factor. Author

N86-17371# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPENSATING STRUCTURE AND PARAMETER OPTIMIZATION FOR ATTITUDE CONTROL OF A FLEXIBLE SPACECRAFT
Decio Castilho Ceballos Jun. 1985 24 p refs Submitted for publication
(INPE-3564-PRE/770) Avail: NTIS HC A02/MF A01

A Feedback Double Path Compensating (FDPC) control structure is considered for the attitude control of a flexible spacecraft, where vibration modes and modelling errors are present. Parameter optimization is applied for finding the controller, so as to have optimized behavior for a high order model. The second-order FDPC controller was tested for the one axis attitude control of a space-craft with flexible appendages, whose dynamics was approximated by a fourteenth-order linear invariant model. The results are found to be satisfactory. Author

N86-17372*# National Academy of Sciences - National Research Council, Washington, D. C. Ad Hoc Committee on Space Station Engineering and Technology Development.
SPACE STATION ENGINEERING AND TECHNOLOGY DEVELOPMENT. PROCEEDINGS OF THE PANEL ON PROGRAM PERFORMANCE AND ONBOARD MISSION CONTROL
1985 72 p Proceedings held in Washington, D.C., 6-7 Aug. 1985
(Contract NASw-4003)
(NASA-CR-176484; NAS 1.26:176484) Avail: NTIS HC A04/MF A01 CSCL 22B

An ad-hoc committee was asked to review the following questions relevant to the space station program: (1) onboard maintainability and repair; (2) in-space research and technology program and facility plans; (3) solar thermodynamic research and technology development program planning; (4) program performance (cost estimating, management, and cost avoidance); (5) onboard versus ground-based mission control; and (6) technology development road maps from IOC to the growth station. The objective of these new assignments is to provide NASA with advice on ways and means for improving the content, performance, and/or effectiveness of these elements of the space station program. G.L.C.

N86-17373*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A CONTROL SYSTEM DESIGN APPROACH FOR FLEXIBLE SPACECRAFT
Larry M. Silverberg (North Carolina State Univ., Raleigh) Nov. 1985 41 p refs
(NASA-TM-87599; NAS 1.15:87599) Avail: NTIS HC A03/MF A01 CSCL 22B

A control system design approach for flexible spacecraft is presented. The control system design is carried out in two steps. The first step consists of determining the ideal control system in terms of a desirable dynamic performance. The second step consists of designing a control system using a limited number of actuators that possess a dynamic performance that is close to the ideal dynamic performance. The effects of using a limited number of actuators is that the actual closed-loop eigenvalues differ from the ideal closed-loop eigenvalues. A method is presented to approximate the actual closed-loop eigenvalues so that the calculation of the actual closed-loop eigenvalues can be avoided. Depending on the application, it also may be desirable to apply the control forces as impulses. The effect of digitizing the control to produce the appropriate impulses is also examined. Author

N86-17374# Italspazio, Rome (Italy).
CONFIGURATION STUDY OF THE NAVSAT SYSTEM SATELLITES Final Report
C. Carnebianca, G. Mastini, and R. Rizzo Paris ESA Jan. 1985 277 p refs
(Contract ESA-5754/84/F-RD(SC))
(ITS-TR-011/85; ESA-CR(P)-2087) Avail: NTIS HC A13/MF A01

NAVSAT configurations using circular, geosynchronous, and highly eccentric orbits were studied. A civil navigation system based on a combination of satellites placed in geosynchronous and Molniya type orbits seems feasible. The proposed TDMA approach consists of a frame with nine bursts separated by a guard time of 105 msec to avoid overlap between bursts. Antipodal satellites share the same time slot. The down link frequency is 1.956 GHz. The satellite constellation consists of six navigation packages in geosynchronous orbit and 12 satellites in highly eccentric orbits. Each elliptic orbit inclined 63.4 deg with respect to the equatorial plane, carries two spacecraft. Three elliptic orbits present the apogee over the north pole and the other three over the south pole. The apogee and perigee altitude are 39,114 Km and 1250 Km respectively. The constellation guarantees a minimum of four visible satellites. Author (ESA)

N86-17375# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
MEASUREMENT OF THERMO-OPTICAL PROPERTIES OF THERMAL CONTROL MATERIALS
Jul. 1984 28 p refs
(ESA-PSS-01-709-Issue-1; ISSN-0379-4059) Avail: NTIS HC A03/MF A01

Equipment and procedure for determining the solar absorptance and total hemispherical emittance properties of thermal control materials are described. The size of samples required for measurements at ESTEC and the precautions to be taken are specified. Author (ESA)

N86-17376# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
TOWARDS DIGITAL COMPUTER SIMULATION OF THE DYNAMICS OF FLEXIBLE SPACECRAFT
P. Th. L. M. vanWoerkom 5 Oct. 1983 90 p refs
(Contract NIVR-1910)
(NLR-TR-83106-U; B8569032) Avail: NTIS HC A05/MF A01

A method based on a sequence of modified modal transformations for numerical simulation of the dynamics of flexible spacecraft equipped with actuators and sensors was developed. The spacecraft assembly is treated as a sampled data system, characterized by locally constant inputs and by outputs at discrete times. The result consists of a system of exact difference equations, which describes the transition of the spacecraft assembly state from one point in time to the next. In this manner, the usual numerical integration of the differential equations of the spacecraft assembly is replaced by exact, numerical, discrete propagation with difference equations. The associated time interval is determined mainly by measurement times, control update times, and measurement and system noise simulation requirements. Author (ESA)

N86-17418*# Martin Marietta Aerospace, Denver, Colo.
DESIGN OPTIMIZATION FOR A SPACE BASED, REUSABLE ORBIT TRANSFER VEHICLE
Larry Redd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 391-401 (For primary document see N86-17380 08-20)
(Contract NAS3-23858)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

N86-17419*# Boeing Aerospace Co., Seattle, Wash.
THE EFFECT OF ENGINE DESIGN CHARACTERISTICS ON ORBITAL TRANSFER VEHICLE PERFORMANCE
George R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 403-411 refs (For primary document see N86-17380 08-20)
(Contract NAS8-36107)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-17377# Kiruna Geophysical Inst. (Sweden).
THE HOT PLASMA SPECTROMETERS ON VIKING
Ingrid Sandahl, Rickard Lundin, and Lars Eliasson Feb. 1985 32 p refs
(KGI-Preprint-077; ISSN-0349-2656) Avail: NTIS HC A03/MF A01

The hot plasma spectrometers on Viking V3 are described. The units measure the distribution function of electrons in the energy range 10 eV to 300 keV, of positive ions without mass separation in the energy range 1 eV to 40 keV, and of positive ions with mass separation in the energy range 1 eV to 70 keV, and mass range 1 to 150 amu/q. The spectrometers study acceleration of auroral electrons, upward flowing ion events, ionosphere - magnetosphere energy exchange due to charged particles, convection of thermal ions, and origin of the hot magnetospheric plasma. Author (ESA)

N86-17378# Societe Europeenne de Propulsion, Vernon (France). Space Dept.
SURFACE POTENTIAL MONITOR Final Report
C. Roulle Paris ESA 27 Aug. 1984 126 p refs
(Contract ESTEC-3663/78/NL-HP)
(SEP-TS/SE/RE/10418/84; ESA-CR(P)-2061) Avail: NTIS HC A07/MF A01

A monitor to measure electrostatic fields on spacecraft surfaces under geomagnetic substorm conditions is described. It uses a capacitance variation to translate the electrostatic field into an ac signal. Operating temperature is from minus 150 to plus 80 C; sensing electrostatic field is up to 50 kV/mm; front area is 2 x 2 sqcm; height = 2 cm. Vibration, thermal vacuum, and functional tests show that output is perfectly linear when compared with the signal of an external scanning probe. At cryogenic temperatures, a phase lock is needed to stay on resonant frequency and to stabilize or measure the vibration amplitude for any temperature. Author (ESA)

N86-17379# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
FUNCTIONAL BUILT-IN-TEST IN A PIPELINE IMAGE PROCESSOR
H. A. vanIngenSchenau, A. Pleijsier, and A. Monkel 5 Mar. 1984 11 p Presented at AGARD Avionics Panel's 47th Symposium, on Design of Tactical Avionics Maintainability, Brussels, Belgium, 7-10 May 1984
(NLR-MP-84020-U; B8568089) Avail: NTIS HC A02/MF A01 .

A method for built-in-test (BIT) applied to the test of function modules of a pipelined image processor is described. The BIT is used as a support tool during the early stages of development and for integration and maintenance. The test method takes advantage of the microprocessors used to interface and control the processor modules. Test programs are inserted in the microprocessor software to test the image processor functionally with a similar data and control flow as in real-time operation. The result is a number of test pictures which can be interpreted in relation to the programmed functions of the image processing. Two-dimensional image formats are used to check the performance of the unit at one glance for several functions and parameter values. Author (ESA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-17380 Johns Hopkins Univ., Laurel, Md. Chemical Propulsion Information Agency.
THE 1985 JANNAF PROPULSION MEETING, VOLUME 1
Karen L. Strange, ed. Apr. 1985 522 p refs Meeting held in San Diego, Calif., 9-12 Apr. 1985 6 Vol.
(Contract N00024-85-C-5301)
(AD-A161084; CPIA-Publ-425) Avail: Chemical Propulsion Information Agency, Johns Hopkins Road, Laurel, Md. 20707 HC $78.98 CSCL 21/8

The Propulsion Meeting is sponsored by the Joint Army-Navy-NASA-Air Force (JANNAF) Interagency Propulsion Committee on an approximately annual basis. The objective of the meeting is to promote the exchange of technical information among the organizations active in the fields of missile, space, and gun propulsion technology. This is the first volume of a six-volume proceedings containing the unclassified, public-release papers presented at the 1985 JANNAF Propulsion Meeting. Topics include satellite propulsion technology, oxygen/hydrogen engines, solid motor component design and evaluation, and liquid propellant compatibility. For individual titles, see N86-17381 through N86-17431.

N86-17381# Morton Thiokol, Brigham City, Utah.
LOW COST CARBON/CARBON NOZZLES FOR SOLID ROCKET MOTORS
Frank Inman and Don Giedt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 1-13 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The technique for fabricating low cost multidimensional carbon/carbon rocket nozzle component preforms by the braiding process is discussed. The basic braiding process has been extended for fabricating ITE, exit cone and ITEC components by adding integral axial and radial graphite fiber elements to the basic biaxial braid architecture. The braided fiber preform is subsequently densified by conventional techniques to obtain a composite with an orthogonal 4-D or planar 3-D fiber construction where desired. The resultant process is highly suited for manufacturing near net thickness and shape solid rocket nozzle components. The details associated with this processing technology development are presented. The details associated with triaxial and 4-D triaxial graphite fiber braiding for rocket nozzle componentry are discussed. Preform rigidization and densification techniques including CVD, HIPIC and LOPIC are reviewed. An assessment of the thermal structural material properties of the braided carbon/carbon composite are presented. The 4-D triaxial carbon/carbon material configured in a monolithic integral throat/exit cone (ITEC) design and tested on a Mortion Thiokol SUBROC motor is presented. The design of a full-scale exit cone employing a braided construction exist cone for test on a minuteman III Stage III motor is also discussed. Author

N86-17382# Naval Weapons Center, China Lake, Calif.
DETERMINING BEHAVIOR OF SOLID ROCKET MOTOR INTERNAL COMPONENTS USING DYNAMIC REAL-TIME RADIOGRAPHY
Donald J. Rogerson, Jr. *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 15-17 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

To better understand the dynamic internal component behavior of solid rocket motors the technique of real-time radiography is employed using a 9 MeV radiographic accelerator. To achieve this goal the real-time imaging equipment and the accelerator are placed in close proximity to the rocket motor and operated remotely during static firing. The engineering considerations of high-hazard environment, compromises of test hardware limitation, portability, and safety are discussed. Results of several tests and future considerations for expanding similar systems are discussed with emphasis on off-the-shelf technology. Author

N86-17383# United Technologies Corp., San Jose, Calif. Chemical Systems Div.
CRACKED BALLISTIC GRAIN TESTS AND ANALYSIS c28
E. C. Francis and W. L. Hufferd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 19-36 refs (For primary document see N86-17380 08-20)
(Contract DAAH01-82-C-A121)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

A computer code developed to predict the interactive effects of ballistic pressure within a flaw and its pressure-induced growth in burning solid propellant grain is presented. The analysis system successfully combines a Fracture Mechanics and a finite element program with ballistic and crack combustion codes, in a system that generates the deformed and burnt profiles at each time during combustion. In this way, combustion-induced pressure loadings on the surface of the grain and inside the flaw, are taken into consideration; thus properly addressing the problem of combustion-induced fracture of solid propellant grains. This code is designed to discriminate between crack burn-out and runaway crack extension. The code has been modified to handle ignition transients caused by igniter variations and flame spreading effects. Analysis and testing of a cracked grain test motor design was conducted to verify the analysis assumptions and predictive capability. Author

N86-17384# Atlantic Research Corp., Gainesville, Va.
THRUST VECTOR TECHNOLOGY DEMONSTRATION
Catherine A. Yezzi, Carl W. Anderson, and Paul Donguy (Societe Europeenne de Propulsion, Bordeaux, France) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 37-43 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

Atlantic Research Corporation (ARC), in a joint effort with Societe Europeenne de Propulsion (SEP) of France, funded the design and demonstration testing of advanced thrust vector control (TVC) concepts: one of these concepts was the supersonic splitline nozzle. The thrust vector control test was performed in the ARC multicomponent thrust stand with the baseline ballistic motor testing being performed in a standard (axial) thrust stand. The supersonic splitline nozzle is a very promising concept developed in the 1960's but abandoned due to material limitations; recent developments in nozzle materials justify further development of the concept. The supersonic splitline nozzle is a very attractive concept in that it offers vector deflection angle augmentation. An advanced lightweight, high temperature composite material manufactured by SEP was selected for use in both the throat and exit cone of the nozzle tested at ARC. Descriptions of motor and the thrust vector control system design, test set-up and test results are presented. Author

N86-17385# Morton Thiokol, Brigham City, Utah.
ELASTOMERIC BARRIER PULSE MOTORS
Charles R. Voris and J. W. Rabern *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 45-53 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The Wasatch Division of Morton Thiokol Inc., recently completed a series of 5.5 in. dia elastomeric barrier radial pulse motor tests that have highlighted some inherent problems with the concept and have demonstrated solutions to many of them. The first test was an utter failure. Our testing then included a

comprehensive series of component tests in a Pulse II simulator focusing on the Pulse II barrier and ignition design variations. This approach to developing the elastomeric barrier proved to be very effective. Once design and material problems were solved in a Pulse II simulator, a successful 2-pulse motor was demonstrated. The motor configuration and its genesis, the Pulse II simulator (known colloquially as the IBIS), and the ultimate motor design are described. Each step along the path of solving design and material problems is addressed. Author

N86-17386*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SMALL, TWO-STAGE, PARTIAL-ADMISSION TURBINE
R. F. Sutton (Rockwell International Corp., Canoga Park, Calif.), J. L. Boynton (Rockwell International Corp., Canoga Park, Calif.), and D. Scheer *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 55-62 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

The Rocketdyne Orbital Transfer Vehicle (OTV) cryogenic, rocket engine system, high pressure, liquid hydrogen turbopump was designed with a two-stage, partial-admission axial turbine. The turbine is basically two single-stage, partial-admission, subsonic impulse stages designed so the kinetic energy leaving the first-stage rotor is discharged directly into the second-stage nozzle at nominal operation to minimize staging losses. Very little data were available in the literature for this type of turbine design. Therefore, it was decided to test a full-size model of the turbine design using ambient-temperature gaseous nitrogen as the working fluid. The tester design features a variable orientation second-stage nozzle to determine the optimum circumferential location for highest performance. The tester also features the capability to vary the nozzle arcs of admission and incorporates quartz windows to study the flowfield upstream of the second-stage nozzle using a laser velocimeter. The test operations will probe the efficiency and flow characteristics for three arcs of admission and the effects of second-stage nozzle circumferential orientations over wide ranges of speed and pressure ratios as well as the interstage pressure distributions. Author

N86-17387*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.
AN EXPERIMENTAL DATA BASE FOR MATERIAL SELECTION AND DESIGN OF HIGH-SPEED, HIGH-PRESSURE, OXYGEN TURBOMACHINERY
Len Schoenman (Aerojet TechSystems Co., Sacramento, Calif.) and Joel M. Stoltzfus *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 63-77 refs (For primary document see N86-17380 08-20)
(Contract NAS3-23772)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

New technologies for space-based, reusable, throttleable, cryogenic, orbit transfer propulsion are being evaluated. A variable-thrust (200 to 3000 lbF), 2000 psi chamber pressure, LO2/LH2 engine has been selected to demonstrate the 20-hour, 500-restart life goal, and a specific impulse of 480 lbF-sec/lbM. The advanced design uses warm oxygen to power a fully integrated turbopump that delivers 4500 psi LO2. The selected engine cycle provides the following advantages over conventional expander cycle designs which use H2 to drive the LH2 and LO2 pumps; higher engine operating pressures and performance in a smaller envelope, lower turbine operating temperatures, elimination of interpropellant seals and purges, and an extended throttling range. The design approach and results of testing to characterize materials for use in high-pressure gaseous oxygen are discussed. Test methods include particle impact testing in a sonic-flow, hot GO2 streams and forced, high-speed friction rubbing testing. Materials are exposed to oxygen and nitrogen atmospheres at pressures of 100, 1000, and 3000 psi to identify separately the gas cooling effects from the metal oxidation effects at the rubbing surface. The selection of candidate design materials is based on an analytical parameter defined as the burn factor. Typical materials tested include carbon steel, stainless steel, nickel, copper, and monel alloys. Author

N86-17388# Hercules, Inc., Magna, Utah.
BOUYANT FLOW AND ITS EFFECT ON INTERNAL INSULATION PERFORMANCE: NUMERICAL APPROACH
S. P. Purcell and W. L. Daines *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 79-88 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A thorough understanding of the gas flow in the combustion chamber of a solid rocket motor (SRM) is crucial to the prediction of such phenomena as erosive propellant combustion, internal insulator performance, and particle (droplet) formation. Differences in internal insulator performance between static and flight tests is a common phenomenon. It is hypothesized that bouyancy plays a determining role in this difference. A coupled fluid/thermal analysis was performed to study the feasibility of numerically solving this problem. The calculational method was an explicit-implicit approach based on the Simplified Arbitrary Lagrangian Eulerian (SALE) computer program originally written by Los Alamos National Laboratory. Analysis results are presented in the form of flow velocity plots for both bouyant and nonbouyant cases. Results indicate that recirculation is predicted for the configuration chosen for study, and that this flow pattern substantially changes the gas environment in the region of the insulator in the forward dome and, hence, predicts a difference in insulator performance. Author

N86-17389# Hughes Aircraft Co., Canoga Park, Calif. Missile Systems Group.
FAST COOK-OFF TESTS OF THE AMRAAM AIR VEHICLE c28
G. W. Cox and R. Sharma *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 89-97 (For primary document see N86-17380 08-20)
(Contract F08635-82-C-0001)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

As a result of several catastrophic accidents aboard carriers, efforts have been directed toward making air launched ordnance resistant to detonation when engulfed in an aircraft fuel fire. MIL-STD-1648 specifies the criteria and procedures to be used in demonstrating an acceptable level of cook-off safety. The Hughes Aircraft Advanced Medium Range Air-to-Air Missile (AMRAAM) has been designed with a unique system to allow the missile propulsion system to meet these criteria. The Warhead and SAF also have protective features which ensure the safety of the missile system. Some of the fire safety features of the missile are described. The system that makes the AMRAAM probably the safest munition available for some time to come: the Thermally Initiated Venting System, TIVS is reviewed. An overview of the test plant to validate the system will be followed by results of the two successful all-up-around air vehicle tests. Author

N86-17390# Morton Thiokol, Brigham City, Utah.
FACTORS AFFECTING PI SUB k IN HTPB FORMULATIONS c28
M. M. Roland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 99-105 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

The importance of temperature sensitivity in the design and performance of tactical rocket motors manifests itself in overall motor efficiency and cost. Pressure excursions may occur if the rate of energy release exceeds limits. The maximum expected operating pressure (MEOP) may be exceeded. To provide a margin of safety, a thicker case and additional insulation becomes necessary. This preventive measure adversely affects the performance of the rocket motor and increases the cost. Work done at Morton Thiokol, Inc. to identify factors that affect temperature sensitivity in HTPB formulations is described. A tactical missile

propellant (HTPB, 91 percent total solids) was used as the baseline. Small laboratory motors were prepared from 1-gal. mixes. These mixes were prepared with variations in coarse and fine AP particle size, Al particle size, and total aluminum content. Author

N86-17391# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ANALYSIS OF A GAS GENERATOR SYSTEM
C. W. Nelson and D. E. Kooker *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 107-121 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A small gas generator suddenly failed in acceptance tests after a string of successes. Intensive tests and rough calculations said that heat transfer to the cold surroundings, coupled with a change in burning-rate exponent at low pressure, caused the failure. Two math models, a lumped parameter model and a full one-dimensional fluid mechanics model were devised to explain the interaction among combustion, heat transfer, and fluid mechanics. The models predict that a reasonable estimate of heat loss does not, by itself, explain the failures. The success of an isolation venture can only be partially explained by heat transfer. Suspicion then rests on the assumption of equilibrium combustion thermodynamics at the very cold temperatures where the failures occurred. Variations with age and propellant batch are still not exonerated, even though the critical problem seems to have been solved. Author

N86-17392# Westinghouse Electric Corp., Sunnyvale, Calif.
MOONBURNER: AN ULTRA-HIGH WEB FRACTION GRAIN DESIGN c28
William M. Wood *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 123-130 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

The development of a new ultra-high web fraction solid propellant grain design is described. The concept allows the design of progressive, regressive, or neutral burning grains with web fractions as high as 1.6 combined with high volumetric loading. The ultra-high web fraction feature allows the typical tactical or sounding rocket motor to burn for at least twice as long, with current propellants, as with previous grain designs. In addition, the pressure-vs-time profile can be tailored to be more rectangular, as is illustrated with a comparative overplot. Volumetric loading as high as 96% is achievable in some designs. A computerized mathematical model of the new grain design was created and exercised to obtain predictions of performance. This is presented, as well as plots of predicted chamber pressure-vs-time for a typical tactical sustainer motor. Experimental development of the concept, from initial motor tests up through static tests with up to 13.5 Lb sub m of propellant is detailed. The burning time of a 6.25 inch diameter motor was 54 seconds. Larger 13-inch diameter hardware under construction is also described. A small sounding rocket lights to 3 miles with 1 Lb sub m of propellant to larger tactical-sized rockets using a modified version of the new grain design that reach 65,000 feet altitude with up to 186 Lb sub m of propellant. To date, 27 five-inch diameter flightweight motors, each with 46.5 Lb sub m of propellant, have been fabricated. Twenty-four of these motors have been flown with a success rate of 92%. Potential applications of the design in solid propellant tactical and sounding rocket and ramjet motors are described. Author

N86-17393# Aerojet Tactical Propulsion Co., Sacramento, Calif.
THE 2.75 MINIMUM SIGNATURE BARRAGE ROCKET
R. L. Mitchell *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 131-136 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A minimum signature 2.75 in. rocket motor utilizing MK 66 hardware was demonstrated with a series of static tests at Sacramento and flight tests at Yuma Proving Grounds. The major concerns were combustion stability, ignitability, and spin-induced burn rate enhancement. The static tests verified that the motor was stable and that reliable ignition was achieved at L"s above 50. Flight test data verified insignificant burn rate enhancement with burn times equivalent to the static test values. Ranges achieved with a 15 lb payload configured with a von Karmen ogive were 16 to 17 kilometers. Author

N86-17394# Morton Thiokol, Brigham City, Utah.
USE OF PEEL VALUES IN STRUCTURAL ANALYSIS c39
S. J. Bennett and A. W. MacBeth *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 137-144 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

Peel values have been used extensively to evaluate the quality of a bond system but have had limited utility in structural analysis. This situation arose from the sensitivity of the peel value to material formulation changes, bond system processing, and material aging and, contrariwise, to the obscure meaning of the peel value. As a practical matter, low peel values have been associated with motor failures while high peel values appear to have a desirable degree of merit. Thus, peel testing is a commonly used bond evaluation method. An interpretation of the peel value has allowed its use in motor structural analysis. The interpretation and analytical results are presented. Author

N86-17395*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CORROSION OF METALS BY HYDRAZINE c26
E. A. Lawton, C. M. Moran, and S. DiStefano *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 145-153 refs (For primary document see N86-17380 08-20)
(Contract NAS7-918)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

The mechanism of corrosion of metals by hydrazine has been studied by the means of coupons in sealed ampoules and by electrochemical techniques. The variables considered were temperature, CO2 impurity level, alloy composition and microcrystalline structures. The coupon studies, to date, verify that increasing temperature and the presence of molybdenum in stainless steels to the expected 3 percent level is not necessarily deleterious, contrary to published reports. The influence of microcrystalline structure and surface characteristics are more dominant effects. However, with Ti-6Al-4V, two different microcrystalline structures showed no significant differences. Corrosion rates of CRES 304 L in hydrazine have also been measured by several electrochemical techniques such as Tafel plots, polarization resistance and A. C. Impedance. This is the first documented work to show that A. C. Impedance can be used with non-aqueous solvents. Preliminary data correlated satisfactorily with the results of the coupon studies. Author

N86-17396*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE EFFECTS OF SURFACE PRETREATMENT AND NITROGEN TETROXIDE PURIFICATION ON THE CORROSION RATE OF TYPE 304L STAINLESS STEEL c26
G. D. Blue and C. M. Moran *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 155-159 refs Sponsored in part by NASA and AF (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

Corrosion rates of 304L stainless steel coupons in MON-1 oxidizer have been measured as a function of cleaning procedures employed, surface layer positions, propellant impurity levels, and

short-term exposure durations (14 to 90 days). Of special interest was propellant contamination by buildup of soluble iron, which may cause flow decay. Surface treatments employed were combinations of cleaning, pickling, and passivation procedures. Propellants used were MIL-SPEC MON-1 and several types of purified NTO (i.e., low water, low chloride) which may, at a later time, be specified as spacecraft grade. Pretest coupon surface analysis by X-ray photoelectron spectroscopy (XPS-ESCA) has revealed important differences, for the different cleaning procedures, in the make-up of the surface layer, both in composition and state of chemical combination of the elements involved. Comparisons will be made of XPS/ESCA data, for different cleaning procedures, for specimens before and after propellant exposure. Author

N86-17397*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOX/LH2 VANE PUMP FOR AUXILIARY PROPULSION SYSTEMS
Joseph A. Hemminger and Thomas E. Ulbricht *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 161-170 ref Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Positive displacement pumps offer potential efficiency advantages over centrifugal pumps for future low thrust space missions. Low flow rate applications, such as space station auxiliary propulsion or dedicated low thrust orbiter transfer vehicles, are typical of missions where low flow and high head rise challenge centrifugal pumps. The positive displacement vane pump for pumping of LOX and LH2 is investigated. This effort has included: (1) a testing program in which pump performance was investigated for differing pump clearances and for differing pump materials while pumping LN2, LOX, and LH2; and (2) an analysis effort, in which a comprehensive pump performance analysis computer code was developed and exercised. An overview of the theoretical framework of the performance analysis computer code is presented, along with a summary of analysis results. Experimental results are presented for pump operating in liquid nitrogen. Included are data on the effects on pump performance of pump clearance, speed, and pressure rise. Pump suction performance is also presented. Author

N86-17398# Marquardt Corp., Van Nuys, Calif.
BIPROPELLANT EARTH STORABLE ROCKET ENGINES FOR SATELLITES: A 1985 UPDATE
R. Carl Stechman *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 171-179 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

Earth storable bipropellant rocket engines ranging from less than 1 lb up to greater than 1500 lbs were developed for use in satellites and maneuvering stages which provide high performance, long life and insensitivity to system induced operating parameters. The successful multiple program qualification of the R-4D demonstrates the reliability and capabilities of a multiple-doublet film cooled rocket engine. The development of multiple doublet boundary layer cooled engines in the 5 to 25 lb thrust range and the qualification of a flexure guided valve in either a single or dual seat configuration can satisfy most of the requirements of future satellites, transfer vehicles, and stages which require on-orbit attitude control and stationkeeping. Author

N86-17399# Ultramet, Pacoima, Calif.
OXIDATION RESISTANT COATINGS FOR REFRACTORY METALS c26
J. T. Harding, R. H. Tuffias, R. B. Kaplan, and Kurt Chandler (Air Force Rocket Propulsion Lab., Edwards AFB, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 181-187 refs (For primary document see N86-17380 08-20)
(Contract F04611-84-C-0043)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11/6

Ir, Rh, ZrO2 and HfO2 coatings were applied to Re, Nb, W and Mo structures by means of chemical vapor deposition, for the purpose of protecting the latter from oxidation at high temperature. Greatest success was achieved with iridium which forms an adherent coating which is effective to over 2000 C. Organometallics are used as starting compounds in the chemical vapor deposition process for the platinum group coatings. Work is in progress to coat the throats of moderate size rocket nozzles and to determine the degree of protection afforded. A design chart specifying the compatibility of the various coatings with the various substrates and the CVD process parameters peculiar to each is a major objective of this program. Author

N86-17400# Naval Weapons Center, China Lake, Calif.
LARGE-SCALE, COHERENT STRUCTURES AS DRIVERS OF RAMJET COMBUSTION INSTABILITIES
K. C. Schadow, J. E. Crump, V. A. Mahan, J. A. Nabity, K. J. Wilson, and E. Gutmark (Tel-Aviv Univ., Israel) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 189-202 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The relationship between flow instabilities and pressure oscillations was determined in nonreacting tests using hot-wire anemometry and combustion tests using high frequency response pressure transducers. Circular and triangular inlet ducts were studied. The preferred mode of the ducted circular jet determined the acoustic frequency which was excited during combustion. At a low preferred mode frequency (150 Hz), the bulk mode of the combustor was excited; at a higher frequency (1150 Hz) the first or second longitudinal mode of the combustor was dominant. In the triangular-inlet duct tests, the coherence and preferred mode energy were reduced. The effect on combustion instability is being studied. Author

N86-17401# United Technologies Corp., San Jose, Calif.
THRUST MEASUREMENTS FOR RAMJET PERFORMANCE DOCUMENTATION
G. F. Stromberg and R. W. King *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 203-211 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The current trend toward the development of high performance ramjet engines with swirl or nonuniform flow has led to an increased reliance on thrust measurements. Accurate thrust measurements are required because of the difficulty in obtaining combustor pressure measurements for non-uniform or swirling flow that are reliable for documenting engine performance. As a result, considerable attention has been given to the thrust measurement techniques that are used in ramjet test stands. The design philosophy that was used to develop the ramjet thrust measurement systems is presented and documentation of their accuracy is provided. Author

N86-17402# Lawrence Livermore National Lab., Calif.
INITIAL RESULTS FOR THE FAILURE STRENGTH OF A LOVA GUN PROPELLANT AT HIGH PRESSURES AND VARIOUS STRAIN RATES c28
Marc Costantino and Donald Ornellas *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 213-227 Sponsored in part by Army (For primary document see N86-17380 08-20)
(Contract W-7405-eng-48)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

The initial results for the failure strength of a LOVA gun propellant at high pressures and various train rates is presented. Right circular cylinder samples are loaded hydrostatically to pressures of up to 400 MPa (60,000 Psi) then, holding this confining

pressure constant, an additional axial load is applied to create a shear stress. Shear stress as a function of axial strain is measured and values at 3% and 5% axial strain are reported at strain rates of .0001, .01, .1, and 1000/s .0001/s at various confining pressures to 400 MPa. The strenght at .0001/s increases by more than a factor of six over 400 MPa with an increasing slope. Similar rates of increase are found for strain rates of .01 and .1/s. At 0.1 MPa confining pressure, the strength increases by almost a factor of 5 as the strain rate increases from .01 to 2.6(1000)/s. The implications of these data to gun propellant grain design and the vulnerability of LOVA propellants are discussed. Author

N86-17403# Martin Marietta Aerospace, New Orleans, La.
SHUTTLE DERIVED UNMANNED LAUNCH VEHICLE c15
D. N. Buell and J. R. Tewell *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 229-236 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/2

An unmanned launch vehicle derived using existing Space Transportation System (STS) components was studied. The vehicle incorporates a standard STS external tank and solid rocket boosters, a new payload module and a recoverable propulsion/avionics module housing the high cost avionics and propulsion systems. The main propulsion system is a cluster of three STS space shuttle main engines compatible with the STS launch pad. The orbital maneuvering system utilizes components and the reaction control system incorporates modified STS primary and vernier thrusters. A solid rocket propulsion system made up of six motors having a two second burn time is incorporated for decelerating the recoverable propulsion/avionics module to a soft landing. The sidemount shuttle derived launch vehicle can carry 147,000 pounds to a 150 nautical mile circular orbit from the Eastern Test Range of 104,000 pounds from the Western Test Range. With Centaur G-prime the payload capability to geosynchronous Earth orbit is 24,5000 pounds. Performance with an optimized upper stage and a stretched external tank was also investigated. Author

N86-17404*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CYCLIC STRUCTURAL ANALYSES OF ANISOTROPIC TURBINE BLADES FOR REUSABLE SPACE PROPULSION SYSTEMS
J. M. Manderscheid and A. Kaufman *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 237-245 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Turbine blades for reusable space propulsion systems are subject to severe thermomechanical loading cycles that result in large inelastic strains and very short lives. These components require the use of anisotropic high temperature alloys to meet the safety and durability requirements of such systems. To assess the effects on blade life of material anisotropy, cyclic structural analyses are being performed for the first stage high pressure fuel turbopump blade (HPFTB) of the space shuttle main engine (SSME). The blade alloy is directionally solidified MAR-M 246 alloy. The analyses are based on a typical test stand engine cycle. Stress-strain histories at the airfoil critical location are computed using the MARC nonlinear finite element computer code. Author

N86-17405*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED RESEARCH AND TECHNOLOGY PROGRAM FOR ADVANCED HIGH PRESSURE OXYGEN-HYDROGEN ROCKET PROPULSION
S. J. Marsik and S. F. Morea (NASA. Marshall Space Flight Center, Huntsville, Ala.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 247-256 refs Previously announced as N85-21231 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

A research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion technology is presently being pursued by the National Aeronautics and Space Administration (NASA) to establish the basic discipline technologies, develop the analytical tools, and establish the data base necessary for an orderly evolution of the staged combustion reusable rocket engine. The need for the program is based on the premise that the USA will depend on the Shuttle and its derivative versions as its principal Earth-to-orbit transportation system for the next 20 to 30 yr. The program is focused in three principal areas of enhancement: (1) life extension, (2) performance, and (3) operations and diagnosis. Within the technological disciplines the efforts include: rotordynamics, structural dynamics, fluid and gas dynamics, materials fatigue/fracture/life/ turbomachinery fluid mechanics, ignition/combustion processes, manufacturing/producibility/nondestructive evaluation methods and materials development/evaluation/ An overview of the Advanced High Pressure Oxygen-Hydrogen Rocket Propulsion Technology Program Structure and Working Groups objectives are presented with highlights of several significant achievements. Author

N86-17406# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
NONINTRUSIVE SHAFT SPEED SENSOR c35
S. Barkhoudarian and L. Wyatt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 257-269 refs (For primary document see N8-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 14/2

A computerized literature search on nonintrusive/noncontacting speed sensing technologies was performed, resulting in 550 abstracts and 42 articles. Fourteen techniques were identified and theoretically analyzed, resulting in the recommendation of the Microwave, Infrared, and Magnetic technologies for experimental evaluation. Test results with a novel magnetic approach, consisting of a permanent magnet placed on the rotating shaft and a pickup coil placed on the housing, indicated detection of a strong signal from 3.5 inches at the lowest required speed (600 rpm), through a 1.75-inch thich Inconel plate. Test results with microwave and infrared speed sensing approaches indicated transmission of sufficient microwave and infrared energy for detection even through heavily bubble-laden water (15 percent cavitation). Although all three techniques demonstrated feasibility, the magnetic sensor was recommended for preliminary design, which indicated no technical obstacles. Author

N86-17407*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OXYGEN/HYDROCARBON COMBUSTION DEVICES TECHNOLOGY
C. R. Bailey *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 271-280 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

A program was conducted to investigate ignition, combustion and heat transfer characteristics of liquid oxygen and RP-1 fuel applicable to large gas generator cycle booster engines. The program was part of a broad effort intended to generate a combustion devices technology base for both RP-1 and methane fuels and both gas generator and staged combustion engine cycles. Two gas generator injector designs were tested over a chamber pressure range of 1500 to 2300 R. Both configurations were evaluated for combustion efficiency, gas temperature profile and combustion stability. Thrust chamber firings were conducted using a platelet type main injector and a water cooled calorimeter combustion chamber. Test conditions ranged from 1700 to 2200 psia chamber pressure and from 2.0 to 2.8 mixture ratio. A program goal to reduce previously measured nozzle heating rates was achieved, but at the expense of combustion efficiency. Author

N86-17408*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED SEALS FOR LIQUID OXYGEN (LOX) TURBOPUMPS c37
W. Shapiro, R. Hamm, and J. A. Hemminger (NASA. Lewis Research Center, Cleveland, Ohio) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 281-290 refs (For primary document see N86-17380 08-20)
(Contract NAS3-23260)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11A

Reliability, life and vehicle pay load can be enhanced by improved seals on space vehicle propulsion systems. Development of two types of fluid-film seals for application to advanced LOX turbomachines are summarized. The first is a floating ring, helium buffered seal whose function is to exclude intrusion of liquid oxygen (LOX) into the turbine drive. The other is a spiral groove, LOX, face-type configuration designed to break down pressure and minimize leakage of LOX. The Rayleigh-step, floating ring gas seals require low clearances to minimize leakage and stiff films to assure tracking excursions of the rotor and to overcome Coulomb friction between the rings and housings. The design and test results of these buffer seals are described. Results indicate significant performance improvement over seals used on contemporary engines. The possibilities of reducing helium storage requirements and thus increasing payload appear promising. A unique configuration of spiral groove LOX seal was required to avoid detrimental vaporization in the flow path. It was found that fluid turbulence and inertia influence groove geometry and in particular groove depth must be much greater than spiral groove seals using conventional fluids. Author

N86-17409# Department of Transportation, Washington, D. C. Office of Commercial Space Transportation.
REGULATORY ASPECTS OF COMMERCIAL, SPACE TRANSPORTATION c16
H. R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 291-297 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/1

Expendable launch vehicles (ELV's), developed and constantly improved over more than two decades, represent a major national investment and resource needed to ensure continued U.S. leadership in this technology. The policy background preceding P.L. 98-575, The Commercial Space Launch Act, giving the Secretary of Transportation exclusive authority to issue licenses for commercial space launches and launch operations, is reviewed. The launch license process developed to implement the licensing of commercial launch sites, a more complex issue in the preliminary planning stage, is briefly discussed. The central issues involved in setting liability insurance levels for damage caused to persons or property by this commercial space activity, as required by the Act, are summarized. Thus, the framework for a regulatory environment which facilitates growth of this new industry is well underway. Author

N86-17410*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CLOSE-IN CHARACTERISTICS OF LH2/LOX REACTIONS
W. A. Riehl and L. J. Ullian (Eastern Space and Missile Command, Florida) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 299-308 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21I

In deriving shock overpressures from space vehicles employing LH2 and LOX, separate methods of analyses and prediction are recommended, as a function of the distance. Three methods of treatment are recommended. For the Far Field - where the expected shock overpressure is less than 40 psi (lambda = 5) - use the classical PYRO approach to determine TNT yield, and employ classical ordnance (Kingery) curve to obtain the overall value. For the Close-In Range, a suggested limit is 3D, or a zone from a distance of three times the tank diameter to the tank wall. Rather than estimate a specific distance from the center of explosion to the target, it is only necessary to estimate whether this could be within one, two, or three diameters away from the wall; i.e., in the 1, 2, or 3D zone. Then assess whether mixing mode is by the PYRO CBGS (spill) mode or CBM (internal mixing) mode. From the zone and mixing mode, the probability of attaining various shock overpressures is determined from the plots provided herein. For the transition zone, between 40 psi and the 3D distance, it is tentatively recommended that both of the preceding methods be used, and to be conservative, the higher resulting value be used. Author

N86-17411*# National Aeronautics and Space Administration. Johnson (Lyndon B.) Space Center,
COMPUTER SIMULATION OF ENVIRONMENTAL, HAZARD SCENARIOS IN SPACE c61
Robert H. Brown *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 309-319 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 09B

The development of the Advanced Computer Graphics Laboratory at NASA/JSC will enable NASA engineers to utilize state-of-the-art computer systems to simulate and analyze current and planned space missions. These systems utilize computer graphics to animate automated satellite rendezvous and docking, satellite servicing, tether operations, as well as remote manipulator activities and assembly of large space structures including the space station. These computer simulations enhance the engineering evaluation of possible hazardous scenarios in space by allowing users to view from any point in space these activities and determine if any potential problem could occur. Author

N86-17412# Arde, Inc., Mahwah, N.J.
REPORT ON KEVLAR -49 COMPOSITE PRESSURE VESSEL SAFETY TECHNOLOGY PROGRAM c39
D. Gleich *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 321-332 refs (For primary document see N86-17380 08-20)
(Contract F08606-84-C-0029)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

The objective of the program is to define the conditions under which a Kevlar -49 fiber overwrapped metal liner prestressed composite (PSC) tank used for high pressure gas storage fails safe if the metal liner suddenly ruptures during operation. Two sudden metal liner failure modes are investigated; liner unstable brittle crack growth/rupture and ductile, stable crack growth (leak before burst) failure mode. The PSC tankage studied is Kevlar -49 fiber overwrapped cryoformed 301 CRES spherical pressure vessels. The cryoformed 301 CRES liner selection is for convenience. The program output will relate to any liner material. Liner failure modes are defined and failure predictions under operating pressure load are made based on tankage dynamic response computer program calculations presuming a 2 percent fiber strain failure threshold. Full scale (16 inch diameter) and 10 inch diameter subscale spherical pressure vessels are tested. The sudden brittle liner failure mode is experimentally achieved by intentionally embrittling the liner by charging it with hydrogen gas for an extended time period and then subjecting it to operating pressure load. The ductile leak before burst, liner failure mode is induced by EDM machining defects in the liner inside surface and then operating pressure cycling it to produce crack wall break through and leak. Author

N86-17413# United Technologies Corp., San Jose, Calif. Chemical Systems Div.
IMPROVED SPACE MOTOR DEMONSTRATION
R. J. Hall *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 333-343 (For primary document see N86-17380 08-20)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

Improved payload performance may be available from existing space motors by virtue of technology retrofits within the basic design envelope of the existing motor. This approach was used to refit existing IUS SRM-2 inert hardware and demonstrate by test, technologies which, if applied to both stages of IUS, would result in a 17% payload capability increase. The primary design improvements relative to IUS which contributed to the performance increase in the Improved Space Motor (ISM) demonstration were the use of a higher energy propellant, a higher volume fraction grain design and a nozzle mounted consumable igniter. In addition, other technology and design improvements, applicable to the IUS and INTELSAT VI motor programs, were demonstrated. The ISM test results and the demonstrated improvements are reported.

Author

N86-17414# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

ROCKET MOTOR SLAG FORMATION. EFFECTS OF INTERNAL FLOW FIELD AND PROPELLANT GRAIN CONFIGURATION

V. E. Haloulakos *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 345-356 refs (For primary document see N86-17380 08-20)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A series of specific solid propellant rocket motors are evaluated and their slag mass accumulation potential assessed when operating in strong acceleration environments. It is shown that the configuration of the propellant burning surface during the last 10 seconds of burning has a very strong effect on slag formation. Motors with front-end burning grains at burnout have maximum slag retention potential whereas motors with the grain burning inside potential slag pockets, e.g., the buried nozzle cavities, do not accumulate any slag. The effects of the internal flow field are significant since they are the direct result of the grain configuration. It is concluded that if slag is a problem, then selective grain design will tend to minimize it or to eliminate it completely. Author

N86-17415# United Technologies Corp., San Jose, Calif. Chemical Systems Div.

IUS PROPULSION STATUS

Charles A. Chase and Douglas A. North *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 357-374 Previously announced in IAA as A84-40240 Prepared in cooperation with Boeing Aerospace Company, Seattle, Wash. (For primary document see N86-17380 08-20)

(Contract F04701-C-0040)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

On April 4, 1983 the second Inertial Upper Stage (IUS) flight vehicle was carried into low Earth orbit by the Shuttle Transportation System (ST6-6). The first stage (SRM-1) successfully completed its mission to carry the IUS vehicle and TDRS payload to geosynchronous transfer orbit. However, during the second stage (SRM-2) burn an uncommanded change in thrust vector occurred which placed the TDRS into an incorrect orbit. The flight anomaly initiated an extensive investigation to establish the cause and corrective action. This paper addresses each phase of the investigation, including: (1) review of available flight data; (2) development of a fault tree; (3) evaluation of possible causes; (4) results of supporting analytical and component test efforts; (5) resulting enhanced design, processing, and acceptance test requirements; and (6) the motor test program that was initiated to verify analytical models of the design and establish the confidence needed to proceed with future flights. The results to date show that: (1) the most probable cause has been identified, (2) the analysis models have been verified via two full-scale motor firings, (3) all corrective actions have been initiated, (4) new flight hardware is in fabrication, and (5) the final confirmatory motor tests are being readied to complete the investigation/corrective action sequence of events. Author

N86-17416*# General Dynamics/Convair, San Diego, Calif.

ORBITAL TRANSFER VEHICLE ENGINE INTEGRATION STUDY

W. J. Ketchum *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 375-382 Prepared in cooperation with Aerojet Techsystems Co., Sacramento, Calif. (For primary document see N86-17380 08-20)

(Contract NAS3-23772)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Industry studies were undertaken to establish the technology base for an advanced engine for Orbital Transfer Vehicles for mid-1990s IOC. This paper presents the results of a study conducted by General Dynamics Convair Division, under contract to Aerojet TechSystems Company for NASA-LeRC, to define requirements, interface conditions, and operational design criteria for new LO2/LH2 propulsion systems applicable to future Orbit Transfer Vehicles, and to assess the impacts of space basing, man rating, and low-g transfer on propulsion system design requirements. The primary study emphasis was to determine what the OTV engine thrust level should be, how many engines are required on the OTV, and how the OTV engine should be designed. This was accomplished by evaluating planned OTV missions and concepts to determine the requirements for the OTV propulsion system, conducting tradeoffs and comparisons to optimize OTV capability, and evaluating reliability and maintenance to determine the recommended OTV engine design for future development.

Author

N86-17417*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

RADIATION EXPOSURE AND PERFORMANCE OF MULTIPLE BURN LEO-GEO ORBIT TRANSFER TRAJECTORIES c13

Sol H. Gorland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 383-389 refs Previously announced as N85-21228 Sponsored in part by NASA (For primary document see N86-17380 08-20)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Many potential strategies exist for the transfer of spacecraft from low Earth orbit (LEO) to geosynchronous (GEO) orbit. One strategy has generally been utilized, that being a single impulsive burn at perigee and a GEO insertion burn at apogee. Multiple burn strategies were discussed for orbit transfer vehicles (OTVs) but the transfer times and radiation exposure, particularly for potentially manned missions, were used as arguments against those options. Quantitative results concerning the trip time and radiation encountered by multiple burn orbit transfer missions in order to establish the feasibility of manned missions, the vulnerability of electronics, and the shielding requirements are presented. The performance of these multiple burn missions is quantified in terms of the payload and propellant variances from the minimum energy mission transfer. The missions analyzed varied from one to eight perigee burns and ranged from a high thrust, 1 g, acceleration, cryogenic hydrogen-oxygen chemical propulsion system for a continuous burn, 0.001 g acceleration, hydrogen, fueled resistojet propulsion system with a trip time of 60 days. Author

N86-17418*# Martin Marietta Aerospace, Denver, Colo.

DESIGN OPTIMIZATION FOR A SPACE BASED, REUSABLE ORBIT TRANSFER VEHICLE c18

Larry Redd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 391-401 (For primary document see N86-17380 08-20)

(Contract NAS3-23858)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

Future NASA and DOD missions will benefit from high performance, reusable orbit transfer vehicles. With the advent of a space station, advanced engine technology, and various new vehicle concepts, reusable orbit transfer vehicles that provide significant economic benefits and mission capability improvements will be realized. Engine and vehicle design criteria previously have

lacked definition with regard to issues such as space basing and servicing, man-rating and reliability, performance, mission flexibility, and life cycle cost for a reusable vehicle. The design study described here has resulted in the definition of a reusable orbit transfer vehicle concept and subsequent recommendations for the design criteria of an advanced LO2/LH2 engine. These design criteria include number of engines per vehicle, nozzle design, etc. The major characteristics of the vehicle preliminary design include low lift to drag aerocapture capability, a main propulsion system failure criteria of fail operational/fail safe, and either two main engines with a high performance attitude control system for back-up or three main engines with-which to meet this failure criteria. In addition, a maintenance approach has been established for the advanced vehicle concept. Author

N86-17419*# Boeing Aerospace Co., Seattle, Wash.
THE EFFECT OF ENGINE DESIGN CHARACTERISTICS ON ORBITAL TRANSFER VEHICLE PERFORMANCE c18
George R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 403-411 refs (For primary document see N86-17380 08-20)
(Contract NAS8-36107)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

The objective in maximizing performance for a space-based Orbital Transfer Vehicle (OTV) is to minimize the propellant required to successfully complete a given reference mission and thereby reduce launch and storage costs. Engine sizing studies were conducted which examined the effect of engine design characteristics on the total propellant required to accomplish the manned and unmanned OTV missions anticipated for the 1995 to 2010 time period. Two propellant combinations, O2/H2 and N2O4/MMH, were selected as baselines. Exotic combinations such as F2/H2 and O2/CH4 were also studied to identify potential benefits and growth capabilities. Parametric results showing the effects of engine thrust, number of engines, nozzle area ratio and payload requirements are presented for various reference missions. The results indicate that the optimum engine size and thrust are not significantly affected by detailed engine design characteristics. Author

N86-17420*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE STATION ADVANCED PROPULSION AND FLUID MANAGEMENT PROGRAM
R. J. Richmond and L. W. Jones *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 413-421 ref Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

In preparation for the development of a manned space station program of advanced technology and development to make new advanced propulsion options available for the initial space station in the 1990's is described. This paper reviews the objectives of the advanced technology and development program in propulsion, describes its origin and how it relates to the forthcoming development program. The advanced propulsion and fluid management systems to be investigated in the program are discussed along with the rationale for their selection. Finally, the systems test program is discussed. Author

N86-17421# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SPACE STATION PROPULSION APPROACHES AND TECHNOLOGY STATUS
S. A. Evans, J. M. Shoji, W. R. Bissell, K. N. Watts, and J. Graetch *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 423-433 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The space station places new demands upon propulsion in terms of component life times, maintenance ease, refill, reuse, and potential interaction with other on-board systems. Interaction with other systems can be active such as integration with the environmental control/life support system for fluid supply or passive such as the contamination created by thruster exhausts. The wide range of potential candidate approaches to space station propulsion are discussed from monopropellants to oxygen/hydrogen. Component requirements and technology status are evaluated for key components such as pumps, motor, thermal beds, and resistojets. Major issues such as in-space refill are summarized. Author

N86-17422*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE O SUB 2/H SUB 2 PROPULSION MODULE FOR PLANETARY SPACECRAFT INJECTION ENERGY AUGMENTATION
B. A. Palaszewski *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 435-443 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

A propulsion module to augment the Centaur G-Prime and the Aerobraked OTV (AOTV) injection energy (C sub 3) was studied. The characteristics and performance of a variety of Earth-storable and cryogenic propulsion systems are presented. A pump-fed, cryogenic O2/H2 propulsion system enables the elimination of a three-year delta V Earth gravity assist (delta VEGA) maneuver for several planetary missions currently under consideration by the NASA. This trip time reduction can significantly reduce mission support costs, reduce spacecraft (S/C) life requirements and potentially increase the probability of mission success. This study also shows that an O2/H2 propulsion module, developed for Centaur C sub 3 augmentation can be used with a space-based AOTV in the return mode, allowing the reuse of the high-value AOTV while still delivering the required high-injection energy for direct planetary missions. The propulsion module performance was estimated for a space shuttle delivery capability to LEO of 65,000 lb sub m and 75,000 lb sub m. The required minimum thrust level to minimize gravity losses was also determined. For several currently planned NASA planetary missions, the Centaur G-Prime injection energy is augmented by a delta VEGA maneuver. For these missions, direct injection by the Centaur cannot provide a shorter trip time than the delta VEGA injection trip time. Author

N86-17423*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOLAR THERMAL PROPULSION FOR PLANETARY SPACECRAFT
J. C. Sercel *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 445-456 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21C

Previous studies have shown that many desirable planetary exploration missions require large injection delta-V. Solar Thermal Rocket (STR) propulsion, under study for orbit-raising applications may enhance or enable such high-energy missions. The required technology of thermal control for liquid hydrogen propellant is available for the required storage duration. Self-deploying, inflatable solar concentrators are under study. The mass penalty for passive cryogenic thermal control, liquid hydrogen tanks and solar concentrators does not compromise the specific impulse advantage afforded by the STR as compared to chemical propulsion systems. An STR injection module is characterized and performance is evaluated by comparison to electric propulsion options for the Saturn Orbiter Titan Probe (SOTP) and Uranus Flyby Uranus Probe (UFUP) missions. Author

N86-17424# Rocket Research Corp., Redmond, Wash.
ANALYSIS OF ELECTRIC PROPULSION CONCEPTS FOR NEAR-TERM MISSION APPLICATION
W. W. Smith and S. C. Knowles *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 457-467

refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/3

A study of near-term mission application of three electric propulsion technologies has been conducted. Surveys of existing and projected electric propulsion capabilities including system mass, power level, Isp and efficiency were utilized. Space system requirements for the next 10 years for stationkeeping, orbit transfer and orbit maneuvering were used to support mission analysis comparison. The three systems considered were the arcjet, inert gas ion and pulsed plasma thrusters. Propellants considered for arcjet systems included H2, NH3 and N2H4. Stationkeeping applications were compared on the bases of system mass, power requirements, duty cycles, and thruster lifetime. Orbit transfer applications comparison included STS lift capability and trip-time requirements. The results showed that arcjet systems provided the most effective means of meeting near-term low to moderate thruster requirements. Pulsed plasma thruster systems must be increased in thrust from the existing 1-mlbf thrust level to a minimum of 10-mlbf thrust level to perform stationkeeping of 5,000 lbm + satellites. Ion systems were found to have several limitations including high inert mass, very low thrust density and long lifetime requirements. Author

N86-17425*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VACUUM CHAMBER PRESSURE EFFECTS ON THRUST MEASUREMENTS
James S. Sovey, Paul F. Penko, Stanley P. Grisnik, and Margaret V. Whalen *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 469-474 refs Previously announced as N85-21259 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Tests were conducted to investigate the effect of vacuum facility pressure on the performance of small thruster nozzles. Thrust measurements of two converging-diverging nozzles with an area ratio of 140 and an orifice plate flowing unheated nitrogen and hydrogen were taken over a wide range of vacuum facility pressures and nozzle throat Reynolds numbers. In the Reynolds number range of 2200 to 12,000 there was no discernable viscous effect on thrust below an ambient to total pressure ratio of 1000. In nearly all cases, flow separation occurred at a pressure ratio of about 1000. This was the upper limit for obtaining an accurate thrust measurement for a conical nozzle with an area ratio of 140. Author

N86-17426*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPATIBILITY EXPERIMENTS OF FACILITIES, MATERIALS, AND PROPELLANTS FOR ELECTROTHERMAL THRUSTERS
Margaret V. Whalen, Stanley P. Grisnik, and James S. Sovey *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 475-484 refs Previously announced as N85-21260 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Experiments were performed to determine the compatibility of materials and propellants for electro-thermal thrusters. Candidate propellants for resistojet propulsion include carbon dioxide, methane, hydrogen, ammonia, and hydrazine. The materials being examined are grain stabilized platinum for resistojets for space station and rhenium for high performance resistojets for satellites. Heater mass loss and deterioration of materials were evaluated. A coiled tube of platinum, with yttria dispersed throughout the base material to inhibit grain growth, was tested in carbon dioxide at 1300 C for 2000 hr. Post-test examination indicated the platinum-yttria heater would last over 100,000 hr with less than 10 percent mass loss. Short-term compatibility tests were conducted to test the integrity of the platinum-yttria in hydrogen, methane, carbon dioxide/methane mixtures and ammonia environments. In each of these 100 hr tests, the platinum-yttria mass change indicated a minimum coil life of 100,000 hr. Facility related effects were investigated in materials tests using rhenium heated to high temperatures. Vacuum facility water reduction was monitored using a mass spectrometer. In vacuum environments obtained using only diffusion pumping and those obtained with the assistance of cryogenic equipment there were mass gains in the rhenium heaters. These mass gains were the result of the high amount of oxygen and water contained in the gas. Propellant purity and preferred test facility environments are discussed.
G.L.C.

N86-17427*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THERMAL ARCJET TECHNOLOGY FOR SPACE PROPULSION
T. J. Pivirotto and D. Q. King *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 485-494 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21C

Advanced space propulsion systems are required to meet projected Air Force needs through the year 2000. Most of these missions require a large, on-orbit impulse capability. High specific impulse (I sub sp) electric engines can provide this impulse while consuming relatively little propellant. An arcjet engine system, which operates in the range of 600 to 2000 s I sub sp, is a promising candidate to meet these projected Air Force mission needs. This electric propulsion system is ideally suited to missions currently under consideration, such as the Space-based Radar and other space platforms, because sufficient power is already installed for other functions on the spacecraft. Also, arcjet systems are attractive for NASA near-term, low-cost Mariner Mark II missions to Saturn and Uranus. Development of arcjet engines was an Air Force and NASA-sponsored activity that proceeded vigorously from its inception during the late 1950's up to the mid-1960's when the programs were terminated. This paper describes thermal arcjet technology as it was developed over two decades ago and points to the direction this technology development should proceed in the future. In particular, operation with storable propellants such as ammonia and hydrazine are considered. The performance, applicability and advantages of these systems in terms of increased payload and/or decreased trip times are discussed. Author

N86-17428# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SOLAR THERMAL ROCKET DESIGN AND FABRICATION
James M. Shoji, Irving Kaith, and Albert G. Pard *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 495-508 refs (For primary document see N86-17380 08-20)
(Contract F04611-80-C-0039)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/3

One potentially attractive propulsion concept offering significant payload gains for Low Earth Orbit (LEO) to higher orbits is solar thermal propulsion. Various solar thermal propulsion concepts have been evaluated and the windowless heat exchanger cavity concept was selected as the most viable near-term concept that could be used for proof-of-principle testing. A high performance ground test absorber/thruster design utilizing currently available materials and fabrication techniques was established, and detailed design drawings prepared. Due to the high temperatures involved, refractory metals such as rhenium, tungsten, molybdenum, and tantalum were required and presented challenges in fabrication and material joining. The material fabrication processes for these materials are in their infancy and require evaluation and development. The ground test absorber/thruster has been successfully fabricated and represents the first fully integrated solar rocket.
Author

N86-17429*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

MICROWAVE ELECTRIC PROPULSION FOR ORBIT TRANSFER APPLICATIONS
Joel C. Sercel *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 509-518 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21C

A Microwave Electric Propulsion (MEP) concept is developed for an unmanned Orbit Transfer Vehicle (OTV). The concept is based on the use of beamed microwave power and on an extrapolation of ion thruster technology. Beamed microwave power transmission is discussed in terms of its relationship to spacecraft propulsion. Characteristics of an MEP OTV are determined and performance is evaluated by comparison to a variety of alternative propulsion systems for the completion of a ten-year mission model. Author

N86-17430*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.
EXPLOSIVE DECOMPOSITION OF HYDRAZINE DUE TO RAPID GAS COMPRESSION c25
O. Briles (Sundstrand Corp., Rockford, Ill.), D. Hagemann (Sundstrand Corp., Rockford, Ill.), F. Benz, and T. Farkas (Rockwell International Corp., Downey, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 519-525 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 07C

Results from tests which attempt to determine conditions which cause explosive decomposition of hydrazine from rapid gas compression are described. Hydrazine was initiated by pressure in combination with shock waves from the pressurant gas. A new test method was developed at the White Sands Test Facility which subjects a gas bubble in contact with liquid hydrazine to pure adiabatic compression. Results from this new test method are compared to those from the U-tube method. Author

N86-17431# Ford Aerospace and Communications Corp., Palo Alto, Calif. Propulsion Engineering.
FLIGHT EXPERIENCE WITH AN INTEGRATED BIPROPELLANT PROPULSION SYSTEM: INSAT 1
Victor A. Moseley *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 527-531 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The INSAT 1 communications, broadcast, and weather satellite was the first spacecraft program to utilize a fully integrated nitrogen tetroxidemonomethylhydrazine propulsion system to accomplish all propulsive maneuvers after injection into orbit. Two satellites in this series have been launched and a third is scheduled to fly on STS Mission 61H in 1986. The integrated bipropellant propulsion system was selected because its high performance and flexibility provided the needed mass capacity for the payloads within the constraints of Delta/PAM-D and STS/PAM-D launch vehicles. This propulsion concept has met all expectations, and has introduced mission options which provide increased overall performance and reliability. This paper provides an update of INSAT 1 flight experience and discusses lessons learned during the past three years of INSAT 1 flights. Author

N86-17432# European Space Agency, Paris (France).
PROCEEDINGS OF ESA SESSIONS AT THE 16TH IEEE ANNUAL POWER ELECTRONICS SPECIALISTS CONFERENCE
W. R. Burke, comp. May 1985 339 p refs In ENGLISH and FRENCH Conference held in Toulouse, France, 24-28 Jun. 1985 (ESA-SP-230; ISSN-0379-6566) Avail: NTIS HC A15/MF A01

Spacecraft power supplies; power converters and inverters; power system simulation; battery and solar array systems; power equipment; high voltage power systems; and power unit simulation were discussed. For individual titles, see N86-17433 through N86-17469.

N86-17433# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
MARECS AND ECS: THE FIRST FEW YEARS IN ORBIT
P. Leggett *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 1-10 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The MARECS/ECS power subsystem, and its in-orbit performance are described. The MARECS A, MARECS B2 and ECS 1 and 2 spacecraft have basically the same power subsystem and from the viewpoint of delivery of power to the users all perform in a totally nominal way. The bus voltage shows no tendency to drift and the loss of array sections does not disturb system operation. The modularity and redundancy incorporated in the power system enable an uninterrupted flow of regulated power to be maintained to users in spite of anomalies encountered on MARECS A. Modifications incorporated on subsequent spacecraft avoided the problems of MARECS A. The solar arrays appear to be degrading at a rate less than the typical values estimated and the batteries are now all controlled by an ampere hour technique which should provide a long lifetime for the power subsystem. Author (ESA)

N86-17434# MATRA Espace, Toulouse (France).
THE TELECOM 1 POWER SUBSYSTEM FROM DESIGN TO FLIGHT
H. Barde *In* ESA Proceeding of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 11-15 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The unregulated power subsystem of Telecom 1 is presented. Primary power is provided by a solar array. Solar array Sun tracking is ensured by the Bearing And Power Transfer Assembly (BAPTA) driven by the solar array drive electronics. Solar array power is routed on board through the BAPTA sliprings, where a diode network generates two main buses and a Sun bus, which is not battery supported during eclipse. Secondary power is derived from two NiCd batteries, each dedicated to a main bus. On sunlight, the batteries are not connected to the buses, hence the operating point is defined only by the solar array characteristic and spacecraft load. The power management unit houses the functions of battery connexion/disconnexion, battery charge and reconditioning, solar array power triming and power subsystem telemetry. A battery control unit ensures battery and cell voltage monitoring, as well as battery protection by end of charge and end of discharge signal generation. Author (ESA)

N86-17435# AEG-Telefunken, Wedel (West Germany).
ALTERNATING CURRRENT BUSES FOR LOW EARTH ORBITS: A VIABLE ALTERNATIVE
Gert Eggers *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 17-25 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The merits of ac buses as complements for large dc systems of space stations are outlined. Wave shapes for systems with frequencies around 400 Hz (as on Spacelab) are considered. When distribution losses are minimized, sinus represents the optimum for linear loads; square-waves for nonlinear (rectifier) loads. Square-waves which do not contain third harmonics can be used in three-phase systems. However, relations between phase and interlinked voltage are not as simple as for sinus. Due to filters not needed and modest rating of components, square-wave systems can be realized with minimum mass-impact and high efficiency. However, fast response to inrush currents and protection of switching semiconductors become difficult. The behavior of sinus systems can be easily predicted. If 3-phase 400 Hz systems are unacceptable because of mass impact, the multi-kHz range is recommended. Author (ESA)

N86-17436# Fabrica Italiana Apparecchi Radio S.p.A., Milan (Italy). Space Div.

THE GIOTTO POWER SUPPLY SUBSYSTEM

E. Re *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 27-37 ref (For primary document see N86-17432 08-20)

Avail: NTIS HC A15/MF A01

The requirements and components of the Giotto power supply subsystem are described. Requirements are: transfer of electrical power between the solar array, the batteries, and spacecraft loads (including each experiment); main bus voltage control using shunt and battery discharge regulation; switching and protection electronics for the experiments, the heaters, and other spacecraft systems; transfer of power to the AOCMS, data handling subsystems, and the despin motor control electronics from dedicated converters; and provision of telecommand and telemetry functions to operate and monitor the system configuration and functioning. The major components are: power control unit; power distribution unit; four batteries; battery regulator units containing a battery discharge regulator and a battery charge regulator; data handling converter; service converter; and external power dumpers (dissipative elements of the shunt regulator). Author (ESA)

N86-17437# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).

THE ERS-1 POWER SYSTEM

J. E. Haines, C. McCarthy, and A. Poncin (Etudes Techniques et Constructions Aerospatiales, Charleroi, Belgium) *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference dMay 1985 p 39-51 refs (For primary document see N86-17432 08-20)

Avail: NTIS HC A15/MF A01

The ERS-1 electrical power system is described. The power system is based on that of the SPOT platform and consists of a battery defined power bus together with a solar array shunt regulator able to control on battery recharge current and selectable end of charge voltage level. The system comprises a 2.1 kW beginning of life solar array, 4 parallel connected 24 Ahr batteries and a shunt regulator which effects the power control between the power source and energy storage system. The Power Distribution Unit (PDU) in the platform distributes power to the instruments via a second PDU integrated in the payload. Primary power is distributed by unregulated and regulated voltage power lines to the platform and payload users. Within the payload two high power buses exist, one dedicated to the high power amplifier of the Active Microwave Instrument, which requires a peak power of 1 kW, the other serves the remaining payload equipments. The platform consumes 300 W continuously. Author (ESA)

N86-17438# Centre National d'Etudes Spatiales, Toulouse (France). Lab. d'Electrotechnique et d'Electronique Industrielle.

DIGITAL STRUCTURE OF AN AUTOPILOTING FOR ASYNCHRONOUS MACHINE FED BY PULSE WIDTH MODULATION (PWM) CONVERTER

M. Grandpierre, M. Pietrzak-David, J. Faucher, and A. Habbadi *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 55-60 refs (For primary document see N86-17432 08-20)

Avail: NTIS HC A15/MF A01

A digital command module for autopiloting an asynchronous, pulse width modulation (PWM) fed electric motor is described. The machine operates with variable frequency. It is shown that the presence of the microprocessor in the control structure greatly facilitates modulation modification to obtain the desired variation of the machine feeding voltage (PWM output). Test results demonstrate that appropriate operation of the system is assured in all four quadrants of the torque-speed plane (motor and generator operation). It can be used easily in the different applications of an autopiloted asynchronous machine as well as in speed variators and position control systems. Author (ESA)

N86-17439# Universidad Politecnica de Madrid (Spain). Dept. of Electronic Engineering.

MULTIPRIMARY WINDING INVERTER WITH LOW HARMONIC CONTENT

J. Carpio, M. Castro (Universidad Nacional de Educacion a Distancia, Madrid), S. Martinez (Universidad Nacional de Educacion a Distancia, Madrid), J. Peire, and F. Aldana *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 61-67 refs (For primary document see N86-17432 08-20)

Avail: NTIS HC A15/MF A01

A static power inverter design which features high efficiency, low distortion and low cost together with a wide protection range for domestic and solar applications is proposed. The prototype is a monophase static inverter with 24V dc battery input voltage and 220V ac output voltage, 50Hz frequency and 250VA output power. This inverter is based on an output multiprimary transformer which composes the output waveforms from four square waves delayed angle values, obtaining a total flux, which is the addition of all primary fluxes, in its secondary core. Total harmonic distortion is small, so output filtering is unnecessary. Author (ESA)

N86-17440# Selenia S.p.A., Rome (Italy).

A SYNCHRONIZED DC/DC CONVERTER FOR THE DATA TELEMETRY SYSTEM OF INTELSAT 6

Silvio Roccucci *In* ESA Proceedings of ESA Session at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 69-72 refs (For primary document see N86-17432 08-20)

Avail: NTIS HC A15/MF A01

A dc/dc converter with free running inverter was designed for the INTELSAT 6 data telemetry system. Synchronization of the inverter with feedback saturable transformer is achieved by forcing the transformer to operate in the same manner as the free-running inverter. The synchronization circuit consists of two transistors, two diodes, and a biasing and limiting resistor. The circuit is connected with a winding of the feedback saturable transformer. Tests show that the synchronization circuit meets specifications. Author (ESA)

N86-17441# Centre National d'Etudes Spatiales, Toulouse (France).

ANALYSIS OF A PARTICULAR WORKING MODE OF S3R TYPE REGULATOR

C Rouzies and P. Tastet *In*ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 73-81 refs (For primary document see N86-17432 08-20)

Avail: NTIS HC A15/MF A01

The over-commutation mode of an S3R type regulator (with series or shunt switches) is described. Its occurrence depends on payload power consumption when there is an integration in the regulation loop. In this mode several sections operate simultaneously and the form of the bus voltage ripple is modified. A theoretical study helped to simulate the phenomenon and to determine the level of power consumption inducing this behavior. Author (ESA)

N86-17442# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.

SPACECRAFT ORBITAL POWER EVALUATION (SCOPE)

W. R. Duncumb and A. N. Casperd *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 85-92 refs (For primary document see N86-17432 08-20)

Avail: NTIS HC A15/MF A01

A FORTRAN program for analyzing the energy balance in a satellite power system during transfer orbit and other mission phases is presented. Piecewise integration is employed for computation of average battery current as the spacecraft spins, instead of calculus, to give full visibility of modeling techniques and provide data for plotting composite current and voltage waveforms. The program models a general power subsystems circuit which it solves for current, voltage and battery depth of

discharge at increments of spacecraft attitude and time. Flexibility, limitations and interpretation of results of the simulation method are discussed. Ways of defining battery capacity are explained to clarify the battery model. Author (ESA)

N86-17443# Lockheed Missiles and Space Co., Sunnyvale, Calif.
A NEW SMALL SIGNAL AC ANALYSIS TOOL FOR SPACE POWER SYSTEMS
J. E. Chen, J. C. Landi, L. M. Dreblow, K. K. Saylors, and R. E. Corbett *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 93-99 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

An interactive, menu-driven computer program was developed to analyze the small signal performance of electrical power systems. The Small Signal AC (SSAC) program enables the analysis of an arbitrary power system configuration using generic components. A component may be specified in terms of canonical circuit parameters or by selecting the entire component from a library. New component models and empirical data can be incorporated in the SSAC analysis through the use of the general component options. The SSAC program computes bus impedances, two-port parameters, loop gains, and small signal transient responses. Author (ESA)

N86-17444# Shanghai Transit Co. (China).
CALCULATION METHODS FOR SHORT-CIRCUIT CURRENTS IN THREE-PHASE BRIDGE RECTIFIER CIRCUITS c33
Fan Yuan-wu *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 101-103 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Matrix methods were used to calculate external short circuit currents in three-phase bridge rectifiers. Transient short circuit currents of rectifiers with dc reactances and resistances can be calculated using the matrix methods. Author (ESA)

N86-17445# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
TEMPERATURE DERIVATIVE BATTERY CHARGE CONTROL c33
H. J. N. Spruijt *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 107-122 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A battery charge termination technique for NiCd batteries which is especially effective in low Earth orbit is presented. End of charge termination is based on the temperature increase at end of charge using the temperature derivative detection principle. This makes the end of charge termination practically insensitive to environmental temperature, depth of discharge, and solar array charge current fluctuation, and guarantees predictable battery voltages, long battery cycle life, and minimum thermal dissipation. It also requires 30% less charging power compared to the conventinal voltage-limited charging technique. Author (ESA)

N86-17446# Toulouse Univ. (France).
USE OF IMPEDANCE MEASUREMENTS TO MODEL NICKEL-CADMIUM BATTERIES [EMPLOI DE MESURES D'IMPEDANCE POUR LA MODELISATION DES ACCUMULATEURS NICKEL-CADMIUM] c33
M. Comtat, P. Delorme, F. Baron (ESA/ESTEC, Noordwijk, Netherlands), and A. Capel (Thomson CSF, Toulouse, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 123-128 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Impedance measurements were performed on nickel-cadmium cells over a frequency range from 0.001 to 10,000 Hz. Impedance diagrams are obtained using a galvanostatic mode for a quasi equilibrium state with a zero constant current intensity and a superimposed alternative current of small amplitude. The results for a battery charged and discharged under standardized conditions are presented. An equivalent electric circuit that best fits the experimental results is proposed. Author (ESA)

N86-17447# Toulouse Univ. (France).
IMPROVEMENT OF THE PROCESS FOR ELECTROCHEMICAL IMPREGNATION OF NICKEL HYDROXIDE ELECTRODES [AMELIORATION DU PROCEDE D'IMPREGNATION ELECTRO-CHIMIQUE D'ELECTRODES D'HYDROXYDE DE NICKEL] c33
M. Comtat, B. Lafage, and J. Leonardi (Societe SAFT, Bordeaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 129-133 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Nickel hydroxide electrodes containing 11g/dsqm hydroxide, with capacities of 3.6 to 3.8 Ah/dsqm were prepared at 353 K by electrochemical impregnation. The reproducibility of the results is obtained by readjusting the pH before each preparation. The control of each electrode is done during two cycles of charge and discharge following the manufacture by a potential relaxation method. Author (ESA)

N86-17448# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE RESULTS OF SOME END OF LIFE TESTS ON THE OTS BATTERY c33
P. Leggett, H. Lechte, and A. Sepers *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 135-143 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Behavior of the OTS battery in orbit and on the ground are compared. The end-of-life tests on the in-orbit battery are described. The battery shows no degradation after $>$ 5 yr in orbit. During this period, the battery was operated with a low overcharge factor (1.02) during eclipse seasons. For the majority of the noneclipse period trickle charge was used. Prior to each eclipse season deep reconditioning to below 0.6 V/cell, following equalization of the cells with the support of the battery protection unit, was carried out. The DOD is moderate with 50%, but the thermal environment is more severe than foreseen. The apparent absence of capacity degradation is thought to be due to a combination of low overcharge strategy, regular deep reconditioning and trickle charge, and a large ratio of actual to nameplate capacity at beginning of life. Author (ESA)

N86-17449# British Columbia Univ., Vancouver. Dept. of Electrical Engineering.
PHOTOVOLTAIC ARRAY SIMULATION
G. Liu and W. G. Dunford *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 145-153 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Two approaches to the simulation of photovoltaic arrays are compared. The first involves the use of a pilot panel and variable light source. In the second, characteristic array curves are stored in the memory of a microprocessor-based simulator. For the first approach, a stability analysis based on Popov's method is presented. Experimental results are presented for both systems. Type 1 is suitable where a field test of a particular panel type is required, while type 2 is suitable for experiments demanding fixed irradiation and temperature levels for a period of time. The experimental results are satisfactory in terms of steady state accuracy and feasibility. The stability analysis program enables the parameters to be adjusted in the type 1 simulator to assume the stability of the system. Author (ESA)

N86-17450# MATRA Espace, Toulouse (France).
AN ALTERNATIVE FOR SATELLITE POWER DISTRIBUTION
P. Ranzoli and F. H. Pedersen (Christian Rovsing Ltd.) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power

Electronics Specialists Conference May 1985 p 157-163 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The electrical system tradeoffs which led to the use of an ac power distribution for HIPPARCOS are exposed. The inverter and the ac/dc modules using power FET's and synchronous rectification are described. Based on HIPPARCOS experience, conclusions are drawn at system level and a philosophy for future satellites is proposed. Author (ESA)

N86-17451# Technische Hochschule, Aachen (West Germany). Inst. fuer Stromrichtertechnik und elektrische Antriebe.
RECOVERY CIRCUIT FOR SNUBBER ENERGY IN POWER ELECTRONIC APPLICATIONS WITH HIGH SWITCHING FREQUENCIES c33
J. C. Bendien, H. vanderBroeck, and G. Fregien *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electron. Specialists Conf. May 1985 p 165-170 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A simple circuit to regenerate turn-on snubber energy stored in an inductor is demonstrated. The efficient use of this circuit is given, if a power switching device switches high currents at high frequencies. The additional voltage stresses on the switching device are limited. The energy regenerated can be transmitted to any voltage source, (dc-voltage link, battery, basedrive-supply). The problem of dissipated power in snubber circuits is considerably reduced. The isolating dc/dc converter (SOI) is very simple and reliable. It works automatically and is suitable for transmission of several kW power. For application in a battery powered electric road vehicle drive, an SOI was designed. Its rated power is 450 W. Measurements show an efficiency up to 86%.
Author (ESA)

N86-17452*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGNING HIGH FREQUENCY ac INDUCTORS USING FERRITE AND MOLYPERMALLOY POWDER CORES (MPP) c33
W. T. McLyman and Albert P. Wagner *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 171-175 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The major considerations in the design of high frequency ac inductors are reviewed. Two methods for designing the inductor: the area product method and the core geometry method, are presented. The two major effects of the inductor air gap, fringing flux power loss and increase of inductance, are discussed. Equations for the inductor design and a step-by-step design procedure are given. The use of a lumped air gap or a distributed air gap are discussed and a comparison of the losses resulting from these gaps, together with experimental results are presented. Author (ESA)

N86-17453# Fabrica Italiana Apparecchi Radio S.p.A., Milan (Italy).
THE 230W TRAVELING WAVE TUBE AMPLIFIER (TWTA) POWER SUPPLY DESIGN c33
A. Gasparini and A. Bonati *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 179-185 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The electronic power conditioner (EPC) design for 230W RF 12 GHz traveling wave tubes is presented. Bus and tube interface problems, the technological aspects versus the very severe environmental requirements, and the protection philosophy are discussed. The EPC has to handle very high power (600 W), to provide outputs voltages up to 7.5 kV, and to guarantee high stability of output parameters inside a very large operating temperature range (minus 35 to plus 70 C). Efficiency is 87%.
Author (ESA)

N86-17454# Selenia S.p.A., Rome (Italy).
A 20 GHz/30 W TRAVELING WAVE TUBE AMPLIFIER (TWTA) FOR OLYMPUS TRANSPONDER c33
S. Roccucci, C. Sciangula, and D. Adirosi *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 187-197 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The Olympus direct broadcast television satellite traveling wave tube amplifier (TWTA) system design considerations affected by the special load interface characteristics on the TWT are reviewed. The high voltage power circuits; high voltage components and design; technological problems in compounding high voltage sections, grounding, and isolation; TWTA performance characteristics, including fault protection, stability and regulation problems; mechanical problems, efficiency; and weight are discussed. The design meets 28 W, 5.5 deg/dB specifications. Author (ESA)

N86-17455# Alcatel Thomson Espace, Courbevoie (France).
APPLICATION OF CURRENT-CONTROL MODULATOR (MC2) CONTROL FEEDBACK FOR 12 GHz 20 W ELECTRIC POWER CONDITIONER (EPC) FOR TELECOM SATELLITE c33
J. P. Desne and C. Peyrotte *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 199-206 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

An electronic power conditioner (EPC) for a 12 GHz 20 W traveling wave tube amplifier (TWTA) was designed. The EPC requirements are summarized, and the electrical design, which used current-control-modulator control is described. A simulation model is proposed. The high-voltage transformer, and hybrid module are described. Interfacing problems caused by the TWT, such as current cathode regulation and switching behavior, are presented. Author (ESA)

N86-17456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN OF HIGH-VOLTAGE, HIGH-POWER, SOLID STATE REMOTE POWER CONTROLLERS FOR AEROSPACE APPLICATIONS c33
John C. Sturman *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 207-216 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Two general types of remote power controllers (RPC's), which combine the functions of a circuit breaker and a switch, were developed for use in dc aerospace systems. Power-switching devices used in the designs are the gate-turnoff thyristor (GTO) and MOSFET. The RPC's can switch dc voltages to 1200 V and currents to 1000 A. Seven different units were constructed and subjected to laboratory and thermal vacuum testing. Two of these were dual units that switch both positive and negative voltages simultaneously. The RPC's using MOSFET's have slow turnon and turnoff times which limit surge currents and voltage spiking from high di/dt. The GTO's have much faster transition times. All RPC's have programmable overload tripout proportional to I sq T and microsecond tripout for large overloads. Author (ESA)

N86-17457# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
DISCHARGE DETECTION IN HIGH VOLTAGE FLIGHT HARDWARE c33
J. C. J. Eeman *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 217-222 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A Faint Object Camera simulation circuit was built for discharge tests in air and poor vacuum, to draw up proposals for use of discharge detection sensors with flight hardware. It is found that high voltage coaxial cables ending in a floating box do not behave the same for large discharges as for corona-like discharges.

The high currents in large discharges exhibit a low source impedance while corona-like discharges represent a higher impedance. Large discharges at atmospheric pressure cause cable reflections and high-voltage excursions of opposite polarity. Discharges in poor vacuum are much slower to build up and do not cause reflections. For flight hardware, logarithmic compression seems unavoidable and signal conditioning for adaption to telemetry inputs needs to be developed. The selection criteria for voltage or current sensors are highly dependent on the amount of capacitance in a system, and on the required sensitivity.
Author (ESA)

N86-17458# Rockwell International Corp., Cedar Rapids, Iowa.
AN ANALYTICAL INVESTIGATION OF CURRENT-INJECTED CONTROL FOR CONSTANT-FREQUENCY SWITCHING REGULATORS c33
Daniel M. Mitchell *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 225-233 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

State-space averaging and linearization are applied to the control law of current-injected, constant-frequency switching regulators, resulting in a bona fide two-loop system representation. As a theoretical goal, first-order behavior can be achieved with no right-half-plane zeroes. Actual performance may be limited by switching frequency interference considerations. Author (ESA)

N86-17459# Politecnico di Milano (Italy). Inst. of Nuclear Engineering.
EXACT CONTINUOUS MODELS OF PULSE WIDTH MODULATION (PWM) REGULATORS IN BOTH CONTINUOUS AND DISCONTINUOUS CONDUCTION MODES c33
P. Maranesi and V. Varoli *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 235-238 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A model for pulse width modulation voltage-regulator dynamics in which the circuit is assumed to be a linear time-variant system, and width-modulation action in the output filter is represented by a suitable set of impulse generators applied at each switching instant, is presented. Once the feedback-loop is open, the comb function of its characteristic response can be expressed by a recursive matrix relation; the latter is Fourier-transformed, achieving the continuous function G-loop. In the discontinuous conduction mode, the procedure directly provides an analytic expression. The model requires minimum computing resources and runs on personal computers. Author (ESA)

N86-17460# Hasler Ltd., Bern (Switzerland).
POWER SWITCHING CELL MODELING: AN EASY WAY c33
A. S. Kislovski *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 239-244 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The notion of controlled quantity and analysis of the nature of cell output voltage are used to derive a cell model. At low perturbation frequencies physical considerations produce a model dominated by the average injected current and the capacitance of the output capacitor; at high perturbation frequencies analogous considerations lead to a model including the discrete injected current and the impedance of the output capacitor. In this way a cell model with extended frequency validity is obtained. The mathematics utilized in obtaining it is not more complex than that needed for the fundamental low-frequency, small-amplitude model. The model is suitable for cell systematization, and computerized tabulation. Author (ESA)

N86-17461# Sperry Rand Corp., St. Paul, Minn.
MODELING AND IMPLEMENTATION OF A DIGITALLY CONTROLLED POWER CONVERTER USING DUTY RATIO QUANTIZATION
C. P. Henze and N. Mohan (Minnesota Univ., Minneapolis) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 245-255 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Discrete proportional-integral-differential (PID) control, driven from a sampling digital error amplifier, was used to generate a quantized duty ratio control signal to provide dynamic output voltage regulation for switching dc-to-dc power converters. Since the sampling frequency of the PID controller is equal to the switching frequency of the power converter, the digital controller may be used at different switching frequencies without recompensation. Digital techniques are used to provide output current limiting, soft-start, undervoltage lockout, overvoltage shutdown, and power master-clear indication. The digital circuitry of a complete power converter control system could then be packaged into a single device. Duty ratio quantization produces low frequency quantization noise in the output voltage of the power converter. Quantization noise in an 8-bit system is found to be 30 dB below the main harmonic of the switching ripple. Author (ESA)

N86-17462# International Business Machines Corp., Poughkeepsie, N.Y.
IMPROVING THE RESPONSE TIME OF A SWITCHING REGULATOR USING SENSIT AND DESIGN/ASTAP c33
John D. Page and Terrence R. Scott *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 257-270 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Circuit stability and response, as measured by the phase margin, and the frequency of the zero dB crossing were written in a form suitable for ASTAP program so that their sensitivities with respect to the statistically specified elements and parameters could be calculated automatically and their corresponding best and worst combinations determined automatically. The same performance criteria were also used in DESIGN/ASTAP to systematically improve the response of the control circuitry of the switching regulator while maintaining its stability, i.e., its phase margin, at 45 deg. Author (ESA)

N86-17463# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
TIME DOMAIN ANALYSIS OF AN S3R SYSTEM c33
L. G. VandenBerghe *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 271-278 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A sequential switching regulator was analyzed in the time domain. Program TRACE was developed to model the control loop thus enabling the analysis of fundamental parameters, including ripple voltage limits, switching frequency, proportional loop gain, effects of loop delays; and response to step off loads. The wide variety of input parameters results in a flexible model for verifying S3R systems. It is a useful design tool for determining loop parameters during the initial stages of design. Author (ESA)

N86-17464# Societe Crouzet, Valence (France).
DESIGN AND DEVELOPMENT OF A CURRENT LIMITED SOLID STATE HYBRID SWITCH c33
C. Neveu and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 281-285 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The design and development of the first of a family of hybrid, low power, current limited, spacecraft power supply solid state switches is presented. The thermal protection technique ensures the FET temperature never exceeds a predetermined threshold level under steady state and transient power dissipation operating modes. The design concept of the switch is described and a test method using an infrared thermal imaging technique, and test

results which validate the concept are included. Solid state switch developments using this design concept are discussed.
Author (ESA)

N86-17465# Christian Rovsing Ltd., Copenhagen (Denmark).
DESIGN AND DEVELOPMENT OF A PYROTECHNIQUE ARMING AND FIRING UNIT **c28**
M. Heisel and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 287-293 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A nondissipative pyrotechnic system consisting of an arm and a fire module is designed. The arm module contains an arm circuit based on two N-channel FET transistors. The first FET transistor is used as a switch, and the other forms part of a buck converter, which performs voltage and current regulation. The current measurement in the positive line of the buck converter is performed by a DOD, based on a Hall-effect current sensor. An over current protection circuit, an over voltage protection circuit, and an input under voltage protection circuit are added to the arm circuit for redundancy and safety protection. The fire module contains a fire circuit based on two N-channel FET transistors. The two transistors are both used as switches. A time-delay circuit makes it possible to stagger the ignition of one pyrotechnic device from 0 to 50 msec in proportion to another, although they are controlled by the same fire telecommand. The duration of the fire pulse command is controlled by the pulse stretching circuit, and can be between 10 and 40 msec. Author (ESA)

N86-17466# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Electrotechnique et d'Electronique Industrielle.
STUDY OF A RESONANT CONVERTER USING POWER TRANSISTORS IN A 25 kW X-RAY TUBE POWER SUPPLY **c33**
Y. Cheron, H. Foch, and J. Salesses (Thomson C.G.R., Issy-les-Moulineaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 295-306 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A converter to feed an X-ray tube (25 kW, 140 KV) from the industrial mains power supply (380 V, 50 Hz) is described. The generator consists of an inverter using power transistors and a transformer-voltage multiplier set connected by a series resonant circuit. The control logic of the transistors gives them the dual properties of those of thyristors. An analytical study of this system allows the characteristics of the converter to be predetermined.
Author (ESA)

N86-17467# Alcatel Thomson Espace, Toulouse (France).
INFLUENCE OF THE BUS REGULATION ON TELECOMMUNICATION SPACECRAFT POWER SYSTEM AND DISTRIBUTION **c32**
A. Capel and D. Sullivan (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 307-318 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The power systems and the electrical distribution of geosynchronous telecommunication spacecraft are evaluated through 13 examples. Results show that the reduction of the bus voltage range is a determinant factor to improve the electrical and mass performances of the power system. For actual power levels, improvements = 25% for solar array mass and 7.6% for the complete power system mass, while the electrical efficiency increases by 13.8% in sunlight and 12.7% in eclipse. A 50 V regulated bus provides 6.76% efficiency improvement, considering only switching components, distribution constitutes 7%. For converter mass, analysis shows that the bulky components of pulse width modulation units are affected by an increase of 70% to 110% depending on sampling frequency when the input voltage is submitted to a variation from 26.5 to 42.5 V. Absence of regulation of the distributed voltage implies an oversizing of the solar array of 25%, to avoid lock up conditions. Author (ESA)

N86-17468# MATRA Espace, Toulouse (France).
A COMPUTER ANALYSIS TOOL FOR EVALUATION OF SOLAR ARRAY DESIGN **c61**
B. Fieux and J. Masson (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 319-323 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A computer tool for evaluating solar array design through definition and/or recall of input design parameters, and output of partial or final results of performances of the simulated solar array was developed. Simulation capabilities include: modeling of a solar cell as a function of physical parameters, temperature and radiation fluxes (Si or Ga As); identification of solar cell parameters from a set of measured experimental curves; evaluation of the solar array curve as a function of cell assembly, orbital environment; evaluation of solar array mean power versus life time; and evaluation of operating point with respect to the load characteristic and orbital position. Author (ESA)

N86-17469# MATRA Espace, Toulouse (France).
MATPWR: A MISSION ANALYSIS TOOL FOR LEO SPACECRAFT POWER PROFILES COMPUTATION
B. Fieux, G. Lample, and P. Noel *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 325-331 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A software tool to compute the power profiles for LEO spacecraft is presented. As outputs, the program delivers the power consumed (interfaced with power subsystem simulations) and analysis results: a report file, containing summarized results and statistics, and an output file compatible with an EARTHMAP visualization package. The tool was used for the ERS4 satellite. It can also be used for data relay satellites by replacing the power of the units by the data rate to transmit they require. Author (ESA)

N86-17470# United Kingdom Atomic Energy Authority, Culham (England).
LIQUID METAL FIELD EMISSION THRUSTERS AND ION SOURCES: A REVIEW Final Report
P. D. Prewett Paris ESA Jun. 1983 250 p refs
(Contract ESTEC-4462/80/NL-AK(SC))
(ESA-CR(P)-2078) Avail: NTIS HC A11/MF A01

The state of development and scientific understanding of liquid metal field emission propulsion systems is reviewed. Ion sources are also reviewed. The need for ion propulsion; the theory of ion emission from liquid metals under the action of high electric fields; and the elementary theory of hydrodynamic effects on surfaces subjected to electric stress are covered. Author (ESA)

N86-17283# Fukui Univ. (Japan). Dept. of Mechanical Engineering.
NUMERICAL SIMULATION METHOD FOR COMBUSTION IN AN OXYHYDROGEN ROCKET MOTOR
Shiro Taki and Toshitaka Fuhwara (Nagoya Univ., Japan) *In* Natinal Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 131-140 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17869*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE STATION POWER MANAGEMENT AND DISTRIBUTION
Fred Teren *In its* Space Photovoltaic Research and Technology 1985 1985 p 279-285 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-17471# Royal Aircraft Establishment, Farnborough (England).
REDUCTION OF ALIPHATIC NITROCOMPOUNDS ON NON-OXIDISED AND OXIDISED CARBON FIBRE ELECTRODES
E. Theodoridou, A. D. Jannakoudakis, and D. Jannakoudakis Feb. 1985 18 p refs Transl. into Zeitschrift fuer Physikalische Chemie, Neue Folge (West Germany), v. 134, 1983 p 227-242
(BR97661; RAE-Trans-2128) Avail: NTIS HC A02/MF A01

The reduction of aliphatic nitrocompounds is investigated on carbon fiber electrodes either nonmodified or modified by thermal, electrochemical and chemical oxidation. The nitroalkanes are reduced in water-methanolic buffer-solutions to alkylhydroxylamines through irreversible, diffusion controlled 4-electron-steps: in alkaline solutions the height of the reduction step decreases with time, due to the conversion of the molecules into electrochemically inactive aci-ions. In acetonitrile solutions nitroalkanes are reduced to the corresponding radical anions through irreversible 1-electron-steps, as is proved polarographically. The introduction of benzoic acid, lithium salts as well as of thermally oxidized carbon fibers - having carboxylic groups on their surface - in acetonitrile solutions facilitates the reduction of nitroalkanes to alkylhydroxylamines. The nitroalkanes are also reduced on electrochemically and chemically oxidized carbon fibers in relatively concentrated aqueous or acetonitrile solutions. Finally it was found, that nitroalkane molecules can be intercalated from the liquid state into electrochemically or chemically oxidized carbon fibers. The presence of these molecules in the graphite lattice is reflected through the reduction currents obtained. Author

N86-17472*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF ARGON AND HYDROGEN ON DEPOSITION OF SILICON FROM TETROCHLROSILANE IN COLD PLASMAS
R. R. Manory, R. Avni (Ben Gurion Univ. of tthe Negev, Beer Sheva, Israel), and A. Grill (Ben Gurion Univ. of the Negev, Beer Sheva, Israel) 1985 16 p refs Presented at Fall Meeting of the Materials Research Society, Boston, Mass., 2-7 Dec. 1985
(NASA-TM-87219; E-2820; NAS 1.15:87219) Avail: NTIS HC A02/MF A01 CSCL 07D

The roles of Ar and H2 on the decomposition of SiCl4 in cold plasma were investigated by Langmuir probes and mass spectrometry. Decomposition of the reactant by Ar only has been found to be very slow. In presence of H2 in the plasma SiCl4 is decomposed by fast radical-molecule reactions which are further enhanced by Ar due to additional ion-molecule reactions in which more H radicals are produced. A model for the plasma-surface interactions during deposition of mu-Si in the Ar + H2 + SiCl4 system is presented. Author

24 COMPOSITE MATERIALS

Includes laminates.

N86-17473 Royal Aircraft Establishment, Farnborough (England).
A REVIEW OF THE PHYSICAL AGEING OF EPOXY RESINS AND THEIR CARBON FIBRE COMPOSITES
W. W. Wright Dec. 1984 20 p refs
(RAE-TM-1051(MAT/STR); BR94907) Avail: NTIS HC A02/MF A01

Data on the physical aging of epoxy resins and of carbon fiber composites made from them are reviewed to assess the importance of the phenomenon for the aerospace use of composite materials. With cast resin there is a gradual change in mechanical properties on physical aging, leading to embrittlement and lower fracture toughness. For composites, there is a decrease in strain to failure and in the area under the stress-strain curve upon physical aging. The decrease in toughness is the most worrying feature from the aerospace viewpoint. The phenomenon must therefore be taken into account in using composite materials especially at temperatures approaching the glass transition point. Author (ESA)

N86-17474 Royal Aircraft Establishment, Farnborough (England).
EFFECT OF CARBON FIBER SURFACE TREATMENT ON MOISTURE ABSORPTION AND INTERLAMINAR SHEAR STRENGTH OF CARBON FIBRE/EPOXY RESIN COMPOSITES
Om K. Joshi 1 May 1984 34 p refs
(RAE-TR-84047; RAE-Mater/Struct-83; BR94905) Avail: NTIS HC A03/MF A01

Carbon fiber surfaces treated to eight different levels of the standard treatment were molded into unidirectional composites in an epoxy resin. The composites were immersed in boiling water or exposed to a hot humid environment (70C, 95% RH), and the water absorption, swelling, and interlaminar shear strength were measured. The reversibility of these effects was studied by drying the composites at 70C in a vacuum oven and by repeated hygrothermal cycling. More moisture is absorbed for the lower levels of surface treatment where the bond between the fiber and matrix is weaker. Studies of reversibility show that there is a greater probability of permanent damage for low fiber matrix bond strengths and for specimens immersed in boiling water. Author (ESA)

N86-17475*# Old Dominion Univ., Norfolk, Va.
ANALYSES OF QUASI-ISOTROPIC COMPOSITE PLATES UNDER QUASI-STATIC POINT LOADS SIMULATING LOW-VELOCITY IMPACT PHENOMENA Final Report
Ajit Dhundiraj Kelkar Aug. 1984 207 p refs
(Grant NGR-47-003-052)
(NASA-CR-176485; NAS 1.26:176485) Avail: NTIS HC A10/MF A01 CSCL 11D

In thin composite laminates, the first level of visible damage occurs in the back face and is called back face spalling. A plate-membrane coupling model, and a finite element model to analyze the large deformation behavior of eight-ply quasi-isotropic circular composite plates under impact type point loads are developed. The back face spalling phenomenon in thin composite plates is explained by using the plate-membrane coupling model and the finite element model in conjunction with the fracture mechanics principles. The experimental results verifying these models are presented. Several conclusions concerning the deformation behavior are reached and discussed in detail. Author

N86-17476*# North Carolina State Univ., Raleigh. Dept. of Physics.
EFFECTS OF HIGH ENERGY RADIATION ON THE MECHANICAL PROPERTIES OF EPOXY-GRAPHITE FIBER REINFORCED COMPOSITES Interim Report, 1 Jan. - 31 Dec. 1985
R. E. Fornes, R. D. Gilbert, and J. D. Memory [Dec. 1985] 263 p refs
(Grant NsG-1562)
(NASA-CR-176487; NAS 1.26:176487) Avail: NTIS HC A12/MF A01 CSCL 11D

In an effort to elucidate the changes in molecular structural and mechanical properties of epoxy/graphite fiber composites upon exposure to ionizing radiation in a simulated space environment, spectroscopic and surface properties of tetraglycidyl-4,4'-diamino diphenyl methane (TGDDM) red with diamino diphenyl sulfone (DDS) and T-300 graphite fiber were investigated following exposure to ionizing radiation. Cobalt-60 gamma radiation and 1/2 MeV electrons were used as radiation sources. The system was studied using electron spin resonance (ESR) spectroscopy, infrared absorption spectroscopy, contact angle measurements, and electron spectroscopy for chemical analysis. Author

N86-17477*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPECIMEN GEOMETRY EFFECTS ON GRAPHITE/PMR-15 COMPOSITES DURING THERMO-OXIDATIVE AGING
Kenneth J. Bowles and Anne Meyers (Medical Coll. of Ohio, Toledo) 1986 19 p refs Proposed for presentation at the 31st National

SAMPE Symposium and Exhibition, Las Vegas, Nev., 7-10 Apr. 1986
(NASA-TM-87204; E-2860; NAS 1.15:87204) Avail: NTIS HC A02/MF A01 CSCL 11D

Studies were conducted to establish the effects of specimen geometry on the thermo-oxidative stability and the mechanical properties retention of unidirectional Celion 12000 graphite fiber reinforced PMR-15 polyimide composites. Weight loss, flexural strength and interlaminar shear strength are measured at isothermal aging times as long as 1639 hr at a temperature of 316 C for three different specimen geometries. It is found that the three different types of specimen surfaces exhibit different values of weight loss/unit area. The mechanical properties retention is also found to be dependent on geometry for these composites. The interlaminar shear strength decreases significantly over the complete range of aging times. The flexural strength retention starts showing geometric dependency after about 1000 hr of aging at 316C. Weight loss fluxes, associated with the three different types of exposed surfaces, are calculated and used to develop an empirical mathematical model for predicting the weight loss behavior of unidirectional composites of arbitrary geometries. Data are presented comparing experimentally determined weight loss with weight loss values predicted using the empirical model.
Author

N86-17478# Virginia Univ., Charlottesville.
ELECTROCHEMICAL BEHAVIOR OF GRAPHITE FIBER-POLYMER COMPOSITES Final Report, 15 Jan. 1982 - 31 May 1985
G. E. Stoner and G. L. Cahen, Jr. 19 Aug. 1985 7 p
(Contract DAAG29-82-K-0053)
(AD-A160031; ARO-18489.1-MS) Avail: NTIS HC A02/MF A01 CSCL 11/4

Graphite fiber-polymer matrix composites containing about 40 w/o fibers have specific resistivities on the order of 1 to 10 ohm-cm. Such resistivity values are low enough for these materials to be considered for a wide range of electrochemical applications. Three graphite fiber-epoxy matrix composite electrodes were investigated in this study; a randomly oriented composite containing 38 v/o (50 w/o) pitchbased 15 micrometer diameter fibers, a parallel oriented composite containing 50 v/o (65 wo) PAN precursor 7 micrometer diameter fibers, and a perpendicularly oriented composite containing 50 v/o (65 w/o) PAN percursor 7 micrometer diameter fibers. For the purpose of comparison, three additional carbon containing electrodes were the purpose of comparison, three additional carbon containing electrodes were also investigated in this study, namely, pyrolitic carbon, anode-grade bulk graphite, and a specially prepared graphite fiber brush electrode containing 12 micrometer diameter pitch-based fibers. With the exception of the graphite fiber brush electrode, all electrodes were used in a stationary flat plate configuration, Cyclic voltammetry (between oxygen and hydrogen evolution) was performed on each carbon containing electroder in 1 N H2SO4, 30 w/o KOH, and 2M KCl. From the cyclic voltammograms, surface functional groups were identified, and the double layer capacitance was measured for each electrode. Chronoamperometry was used to study two diffusion-controlled electrode processes on each electrode. GRA

N86-17479# Argonne National Lab., Ill.
DEVELOPMENT OF REFRACTORY COMPOSITES WITH IMPROVED FRACTURE TOUGHNESS
J. P. Singh, R. B. Poeppel, J. J. James, and J. J. Picciolo Aug. 1985 24 p refs
(Contract W-31-109-eng-38)
(DE86-000257; ANL/FE-85-1) Avail: NTIS HC A02/MF A01

The effects of unstabilized ZrO2 and W inclusions on the fracture surface energy and thermal-shock resistance of MgCr2O4 have been characterized. The fracture surface energy for MgCr2O4-ZrO2 composites was observed to depend on the agglomerate particle size, size distribution, and volume fraction of the ZrO2 inclusions. Large, nonuniformly distributed ZrO2 inclusions tended to produce a relatively small increase in the fracture surface energy of MgCr2O4. The fracture surface energy increased with increasing ZrO2 content to a maximum value of 24.5 J/sq. m. at 16.5 vol % ZrO2, and decreased as the ZrO2 content increased further. The increase in fracture surface energy for MgCr2O4-W with increasing W content was monotonic for the range of composition studied (less than or equal to10.3 vol % W); a value of 26 J/m(2) was obtained for MgCr2O4-10.3% W composites. It is proposed that these fourfold increases in fracture surface energy result from the absorption of energy due to microcrack formation in the MgCr2O4 matrix, which results from the tensile stresses due to the mismatch in thermal expansion coefficient and/or elastic modulus between the matrix and inclusions. In addition, for MgCr2O4-ZrO2 composites, a major cause of microcracking is the tetragonal yields monoclinic phase transformation of ZrO2 and the associated volume expansion. Thermal quench experiments indicated substantial improvements in the thermal-shock resistance of MgCr2O4 with appropriate ZrO2 and W additions. DOE

N86-17480# Oxford Univ. (England). Dept. of Engineering Science.
EFFECT OF STRAIN-RATE ON THE TENSILE FAILURE OF WOVEN-REINFORCED POLYESTER RESIN COMPOSITES
L. M. Welsh and J. Harding 1985 12 p refs Submitted for publication Sponsored by UK Science and Engineering Research Council
(OUEL-1578/85) Avail: NTIS HC A02/MF A01

Tensile stress-strain curves at strain rates of 0.001, 10, and 1000/sec were obtained for carbon, Kevlar and glass fiber woven-reinforced polyester resin composites. The variation of modulus, tensile strength, and fracture strain with strain rate was determined. A change in the failure mode at the highest strain rates is observed for the glass but not the carbon of Kevlar reinforced composites. Author (ESA)

N86-17481# Oxford Univ. (England). Dept. of Engineering Science.
DYNAMIC TENSILE RESPONSE OF UNIDIRECTIONALLY-REINFORCED CARBON EPOXY AND GLASS EPOXY COMPOSITES
L. M. Welsh and J. Harding 1985 17 p refs Submitted for publication Sponsored by UK Science and Engineering Research Council
(Grant AFOSR-84-0092)
(OUEL-1579/85) Avail: NTIS HC A02/MF A01

Tensile stress-strain curves at strain rates of 0.001, 10, and 1000/sec for unreinforced epoxy resin specimens and for low volume fraction model specimens unidirectionally reinforced with a single layer of glass or carbon fiber tows in the same epoxy resin were obtained. For CFRP specimens a small rate dependence of the modulus and the tensile strength is observed at impact rates of strain. This effect is greater than can be explained in terms of the rate sensitivity of the resin using the rule of mixtures approach. No effect of strain rate on the fracture appearance is detected, but there is a marked change in the fracture mode of GFRP specimens, similar to that for a satin weave GFRP material. At low and intermediate rates failure is controlled by the rate-dependent fracture strength of the glass fibers while, at impact rates, pull-out of fiber tows is the controlling mechanism. This suggests that there is a greater tendency for debonding between the fiber tows and the resin matrix at impact rates of strain.
Author (ESA)

N86-17482# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Betriebsbereich.
METALLIZING OF FIBER REINFORCED COMPOSITES [METALLISIEREN FASERVERSTAERKTER WERKSTOFFE]
R. Suchentrunk 23 Apr. 1985 38 p refs In GERMAN Submitted for publication
(MBB-Z-46/48) Avail: NTIS HC A03/MF A01

Metallization of fiber reinforced composites for protection against environmental conditions and for acquisition of functional surfaces achieved with foil adhesion, damping, sputtering, electroplating, thermal spraying, metal paint coating, adhesion of

preformed profiles, reductive silver mirror coating, and direct and indirect galvanic coating is discussed. Adhesion of the metal coatings to plastics is controlled qualitatively with the stripping and grating tests and quantitatively with peeling and front tensile tests. Industrial application of the metallizing methods for the production of fiber reinforced components are given. Author (ESA)

N86-17483# Institut fuer Fenstertechnik e.V., Rosenheim (West Germany).
INVESTIGATIONS CONCERNING THE AGING BEHAVIOR OF HEAT-INSULATED ALUMINUM COMPOSITE PROFILES Final Report, Dec. 1984
Thomas Einfeldt, Franz Feldmeier, Rudolf Heinrich, Josef Schmid, and Werner Stiell Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 86 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-086; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

The aging behavior of heat-insulated aluminum composite profiles and the changes resulting from external load were studied for damage prevention and heat protection of windows and fronts. A test program for assessment of profile aging and long time rupture behavior and for development of a procedure for system testing so as to provide the manufacturer with guidelines for optimal composite system development and manufacture was worked out. Systems with sufficient transverse tension load and without detectable shear strength may represent an economical solution. The results are relevant for other metal profile systems.
Author (ESA)

N86-17484# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
PHYSICAL CHEMICAL TESTS AND FEASIBILITY STUDY OF THE CIBA-GEIGY R6376 IM6 PREPREG [ESSAIS PHYSICO-CHIMIQUES ET DE FAISABILITE DU PREIMPREGNE CIBA GEIGY R6376-IM6]
J. Levesque and H. Mayer 31 Jan. 1985 35 p In FRENCH
(Contract STPA-83-96-028)
(DGT-26.749) Avail: NTIS HC A03/MF A01

The R6376-IM6 prepreg exothermal behavior, gel temperature, and gel point at constant temperature and with a temperature gradient for several aging times were studied. The feasibility study was done by manufacturing specimens including 5 steps with 20 plies each. No advantage is found when compared with other commercially available products. Author (ESA)

N86-17485# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
EVALUATION OF THE CIBA-GEIGY R6376 IM6 PREPREG [EVALUATION DU PREIMPREGNE CIBA GEIGY R6376-IM6]
J. Levesque and F. Henriot 21 Jan. 1985 74 p In FRENCH
(Contract STPA-83-96-028)
(DGT-26.649) Avail: NTIS HC A04/MF A01

The R6376-IM6 prepreg tensile and impact properties were compared with other commercially available products used in aircraft manufacturing. The comparisons do not show improvements over the currently used preimpregnated composites. Author (ESA)

N86-17486# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
STUDY OF COMPOSITE MATERIAL CURING MOLDS [ETUDE D'UN SOMMIER DE CUISSON EN MATERIAUX COMPOSITES]
S. Dellus 8 Feb. 1985 22 p In FRENCH
(Contract STPA-83-96-028)
(DGT-26.817) Avail: NTIS HC A02/MF A01

A composite mold to manufacture carbon reinforced expoxy matrix composite elements for the aircraft industry is studied. The working temperature for curing is 175C. The tests were carried out either using preimpregnated composites or manually impregnated composites. The study shows that the molds do not differ significantly from the models, that the deformation is low after several autoclave cycles, and that there are consistent advantages regarding weight and thermal inertia. Author (ESA)

N86-17487# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
STATISTICS ON THE BASIC CHARACTERISTICS OF CARBON EPOXY COMPOSITES [STATISTIQUE SUR LES CARACTERISTIQUES DE BASE DES COMPOSITES CARBONE EPOXY]
F. Henriot and M. J. Levesque 7 Feb. 1985 54 p ref In FRENCH
(Contract STPA-83-96-028)
(DGT-27.039) Avail: NTIS HC A04/MF A01

Batches of aircraft preimpregnated composite elements were studied to determine the statistical dispersion of mechanical characteristics and to compare this dispersion with the dispersion among batches. The measurements of tensile strength and modulus show a coefficient of variation of 11.3% and 2% over all data sampled. Author (ESA)

N86-17488# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique des Materiaux.
RELATIONSHIP BETWEEN COMPONENTS AND PERFORMANCE OF COMPOSITE MATERIALS. PART 1: BSL914 MATRIX SYSTEMS [RELATIONS ENTRE CONSTITUANTS ET PERFORMANCE DES MATERIAUX COMPOSITES. PARTIE 1: SYSTEMES A MATRICES BSL 914]
C. Cavalli, M. C. Merienne, J. Ancelle, B. Bloch, D. Charrier, C. Marais, and P. Sigety Feb. 1985 91 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-1/3636-M-Pt-1) Avail: NTIS HC A05/MF A01

An epoxy resin was studied to detect the influence of the formulation on the final composite properties. Preimpregnation was performed in laboratory excluding any fiber finish. The 914 resin was analyzed using quantitative methods. The results presented include the mechanical properties of the fibers, measuring of the resin glass transition point, impact and tensile tests of conditioned composite specimen, and thermomechanical properties of composites. Author (ESA)

N86-17489# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes Materiaux non Metalliques.
ELEMENTARY CHARACTERIZATION OF THE RIGIDITE 5245C/IM6 PREIMPREGNATED CARBON FROM NARMCO U.S., TEST REPORT M3-449000, PART 2 Final Report [CARACTERISATION ELEMENTAIRE DU PREIMPREGNE CARBONE RIGIDITE 5245C/IM6 DE NARMCO U.S., PROCES VERBAL NO. M3-449000, PARTIE 2]
26 Mar. 1985 44 p In FRENCH 2 Vol.
(PV-M3-449000-Pt-2) Avail: NTIS HC A03/MF A01

A system composed of a high performance Hercules fiber and a polyimide resin was tested. The tensile strength is improved by up to 80% compared to epoxy matrix-normal fiber, but the flexion, peeling and compression tests show negative results. A large difference between tensile and compression strengths is deduced. Author (ESA)

N86-17490# Centre d'Essais Aeronautique Toulouse (France). Lab. de Chimie-Inflammabilite.
PHYSICAL CHEMICAL CHARACTERIZATION TESTS OF THE 5245C NARMCO PREIMPREGNATION RESIN, TEST REPORT M3-449000, PART 1 [ESSAI DE CARACTERISATION PHYSICO-CHIMIQUE DE LA RESINE DE PREIMPREGNE 5245C NARMCO, PROCES VERBAL NO. M3-449000, PARTIE 1]
25 Sep. 1984 31 p In FRENCH 2 Vol.
(PV-M3-449000-Pt-1) Avail: NTIS HC A03/MF A01

A carbon fiber prepreg was studied. Liquid chromatography shows three major components: an imide, an aromatic cyanate and analiphatic cyanate. A pH measurement shows the presence of an epoxy resin also. Colloidal silica is the mineral part of the formulation. The glass transition temperature, the polymerization enthalpy, and the degradation temperature are also given.
Author (ESA)

N86-17491# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
CERAMIC COMPOSITES MADE BY SOL-GEL PROCESSING
A. C. Pierre, D. R. Uhlmann (MIT, Cambridge, Mass.), and A. Hordonneau 1985 9 p refs Presented at a Conference, Orleans, France, 9-11 Sep. 1985
(SNIAS-852-430-103) Avail: NTIS HC A02/MF A01

Ceramic-ceramic composites were produced by immersing SiC or alumina fibers in an alumina or zirconia sol or gel. Drying and heat treatment completed the process. A good infiltration of the liquid sol between the fibers was expected, drying-gelling being performed on the sol with the fibers aligned unidirectionnally. The appearance of the composites improves when the acid content used for the peptization of the sol decreases. Although the Al2O3 composites behave better, mechanical properties remain very poor after the heat treatment. Author (ESA)

N86-17492# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
APPLICATIONS OF HOLOGRAPHIC INTERFEROMETRY TO NONDESTRUCTIVE INSPECTIONS OF COMPOSITE MATERIAL STRUCTURES [APPLICATION DE L'INTERFEROMETRIE HOLOGRAPHIQUE AU CONTROLE NON DESTRUCTIF DE STRUCTURES EN MATERIAUX COMPOSITES]
F. Albugues 1985 12 p In FRENCH; ENGLISH summary Submitted for publication
(SNIAS-852-430-112) Avail: NTIS HC A02/MF A01

Nondestructive inspection of the structure of composite materials used in the aerospace industry is discussed. Defects such as peeling, bonding, inclusions, fiber distribution, and the range of usefulness of nondestructive tests such as acoustic inspection, X-ray inspection, infrared thermography and ultrasonic tests are reviewed. Holographic interferometry applications of pulsed lasers, the utilization of thermosensitive photographic film, and the realization of an automatic test bench for specimens up to 2m by 2m are described. Photographs of typical cases are presented. Author (ESA)

N86-17493# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
COMPOSITE MATERIALS: A SOURCE OF INNOVATION [LES MATERIAUX COMPOSITES: SOURCE D'INNOVATION]
Albert Phan 1985 7 p In FRENCH; ENGLISH summary Submitted for publication
(SNIAS-852-430-113) Avail: NTIS HC A02/MF A01

A composite materials design methodology based on the concept of user needs technical specifications is proposed. This results from an equilibrium between user requirements and the technological limitations for manufacturing a specified product. The advantages of such a specification are commented on.
Author (ESA)

N86-17494# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
FATIGUE PERFORMANCE OF PRESTRESSED COMPOSITE PRESSURE VESSELS
A. Pradier and A. Flechais 1985 13 p ref Presented at AIAA/SAE/ASME 21st Joint Propulsion Conference Monterey, Calif., 8-11 Jul. 1985
(SNIAS-852-430-114) Avail: NTIS HC A02/MF A01

The fatigue performance data for a prestressed composite Kevlar 49/TI6AL4V pressure vessel are given and the fatigue behavior and the failure mode of the metallic liner are discussed. The evaluation permitted the restoration of the flow growth curve versus applied proof and service pressure cycles. The equatorial weld joint of the liner shows good fatigue performance. The results achieved are considerably better than the requirements for the TVSAT-TDF1 satellite. Author (ESA)

N86-17495# Societe Nationale Industrielle Aerospatiale, Paris (France).
ANALYSIS IN SIMULATED SPACE ENVIRONMENT OF COMPOSITE MATERIAL BEHAVIOR [ANALYSE EN AMBIANCE SPATIALE SIMULEE DU COMPORTEMENT DE MATERIAUX COMPOSITES]
Francois Albugues 1985 8 p refs In FRENCH; ENGLISH summary Presented at 1st Conf. Europeenne sur les Materiaux Composites
(SNIAS-852-430-116) Avail: NTIS HC A02/MF A01

A device to test in real time the evolution of mechanical properties in a simulated space environment is described. The reason for the choice of this test method and the parameters to be tested are discussed. The simulation chamber is under high vacuum and subjected to ultraviolet and particle radiation. Dynamic mechanical measurements are carried out using optical measurement instruments Author (ESA)

N86-17496# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
FILAMENT WINDING: AN INDUSTRIAL PROCEDURE [L'ENROULEMENT FILAMENTAIRE: UN PROCEDE INDUSTRIEL]
D. Cabanel 1985 11 p In FRENCH; ENGLISH summary
(SNIAS-852-430-117) Avail: NTIS HC A02/MF A01

Filament winding procedures in the aerospace industry are described. The advantages and applications of filament winding outside the aerospace industry are discussed. The possibilities of automation and the manufacturing of complex bodies are analyzed. Author (ESA)

N86-17497# Societe Nationale Industrielle Aerospatiale, Paris (France).
CERAMIC FIBER COMPOSITES: MANUFACTURING AND PERFORMANCES [COMPOSITES A FIBRES CERAMIQUES ET MATRICE SILICE: ELABORATION; PERFORMANCES]
G. Rousseau and J. Iron 1985 14 p refs In FRENCH Submitted for pulbication
(SNIAS-852-430-118) Avail: NTIS HC A02/MF A01

A procedure using silica hydrosols for impregnating a ceramic fiber structure is described. The ceramic fibers, such as SiC fibers, are assembled in a three dimensional structure. The impregnation is done using either classical silica hydrosols or a silicium alcohol compound solution. In the first case the performance improvement is not significant. In the second case tensile strengths of more than twice the strength of pure silica are reported. Author (ESA)

N86-17498# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
DESIGN OF NONAXYSYMMETRIC STRUCTURES (TURBOJET ENGINE NACELLE ELEMENT) Thesis [CONCEPTION DE STRUCTURES NON AXISYMETRIQUES (ELEMENTS DE NACELLE DE REACTEUR)]
J. Lamalle 1985 59 p refs In FRENCH
(SNIAS-852-430-119) Avail: NTIS HC A04/MF A01

The design of an air inlet covering with an average diameter of 2200 mm and length varying between 330 and 510 mm is discussed. The purpose it to show how an asymmetric element can be manufactured by filament winding, using composite materials. The choice of winding procedure is analyzed and all the manufacturing steps are described. The analytical verification of the behavior under external pressure gives results within the specifications. Author (ESA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-17499 Central Electricity Generating Board, London (England). Translations Section.
ON RECOVERY OF PLATINUM FROM SPENT CATALYSTS
M. Yelyaskova, I. Sariev, S. Koralska, S. Aneva, M. Pankova, and

M. Yancheva [1985] 10 p refs Transl. into ENGLISH from Chem Techn, v. 34, no. 12, 1982 p 651-653
(CE-Trans-8042) Avail: Issuing Activity

Aluminum-based catalysts containing platinum are used in numerous processors in oil refining such as reforming, isomerization, hydro-cracking and selective hydrogenation. The platinum is finely dispersed on the alumina carrier which is frequently activated with halogens after a certain working period and after several regenerations, the activity of the contact materials irreversibly drops and the noble metal must be recovered so that new catalysts can be produced. The decisive factors for selecting a method for the recovery of platinum from spent catalysts are mainly the type and concentration of the contaminants, the possibilities for utilizing the waste products, the platinum yield, the costs of the technology etc. However, most of the methods known from the literature contain contradictory information. In the main those methods are recommended which are based on extracting the spent catalysts with strong mineral acids, alkalis or on treatment with phosgene or aluminum chloride. The methods based on chlorination and vaporization of the platinum are superior to the wet processes if the carrier can be reused directly, I.E. if the carrier is not subject to any significant changes during use and during the regenerations. G.L.C.

N86-17500# Royal Aircraft Establishment, Farnborough (England).
THE NATURE OF CHARGE CARRIERS IN ELECTRORHEOLOGICAL SUSPENSIONS
Z. P. Shulman and A. D. Matseputo Apr. 1985 7 p refs Transl. into ENGLISH from Teplo Massoperenos: Teor. Prakt Prilozh. (USSR), 1983 p 19-21
(BR97662; RAE-Trans-2137) Avail: NTIS HC A02/MF A01

Aluminum dihydrotripolyphosphate was studied at different levels of crystalline water and the electro-rheological effect and the conductivity of the sample was compared. Comparisons are made with MNR data and charge emission tests to conclude that proton migration is the basic mechanism in the polarization of the particles and therefore in the electro-rheological effect. Author

N86-17501# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
ACRYLONITRILE-BUTADIENE-STYRENE COPOLYMERS (ABS): PYROLYSIS AND COMBUSTION PRODUCTS AND THEIR TOXICITY, A REVIEW OF THE LITERATURE
Joseph V. Rutkowski and Barbara C. Levin Dec. 1985 63 p refs Sponsored in part by the US Consumer Product Safety Commission, Bethesda, Maryland
(NBSIR-85/3248) Avail: NTIS HC A04/MF A01

A review of the literature was undertaken to ascertain the current knowledge of the nature of the thermal decomposition products generated from ABS and the toxicity of these evolved products in toto. The literature review encompasses English language publications available through June 1984. This literature surveyed showed that the principal ABS thermooxidative degradation products of toxicologic importance are carbon monoxide and hydrogen cyanide. The experimental generation of these and other volatile products is principally dependent upon the combustion conditions and the formulation of the plastic. The toxicity of ABS thermal degradation products was evaluated by five methods. Lethality tests show that no apparent toxicological difference exists between the flaming mode and the non-flaming mode. The toxicity of ABS degradation products was found to be comparable to the toxicity of the thermal decomposition products of other common polymeric materials. Author

N86-17502*# Huntsville Hospital, Ala.
SAMPLE SELECTION AND TESTING OF SEPARATION PROCESSES Final Report, 19 Sep. 1983 - 31 Dec. 1985
Laurel J. Karr Dec. 1985 43 p refs Sponsored in part by Space Universities Research Association
(Contract NAS8-35593; NAS8-35334; NAS8-35362)
(NASA-CR-176569; NAS 1.26:176569) Avail: NTIS HC A03/MF A01 CSCL 07D

Phase partitioning, which has become an important tool for the separation and purification of biological materials, was studied. Instruments available for this technique were researched and a countercurrent distribution apparatus, the Biosheff MK2N, was purchased. Various proteins, polysaccharides and cells were studied as models to determine operating procedures and conditions for this piece of equipment. Results were compared with those obtained from other similar equipment, including a non-synchronous coil planet centrifuge device. Additionally, work was done with affinity ligands attached to PEG, which can further enhance the separation capabilities of phase partitioning. Author

N86-17503# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
SURFACE-ENHANCED RAMAN SPECTROSCOPY AS A PROBE OF ADSORBATE-SURFACE BONDING: SIMPLE ALKENES AND ALKYNES ADSORBED AT GOLD ELECTRODES Technical Report
M. L. Patterson and M. J. Weaver Aug. 1985 31 p
(Contract N00014-79-C-0670)
(AD-A160033; TR-52) Avail: NTIS HC A03/MF A01 CSCL 07/4

The interaction of various alkenes with gold electrodes has been studied using surface-enhanced Raman spectroscopy (SERS). Large decreases, from 70 to 140/cm, were observed in the C-C double bond and C triple bond C stretching frequencies upon absorption which are attributed to absorbate-surface bonding involving these groups. The potential dependence of these SERS frequencies suggests that the Pi yield s (sigma band) overlap is more prevalent than the d yields pi* (pi bond) interaction. Carbon-hydrogen stretching vibrations, nu(C-H), as well as other skeletal modes were also detected for the absorbates; paraffinic, olefinic, and aromatic nu(C-H) modes could readily be distinguished although acetylenic nu(CH) modes were too weak to be detected. Generally, the most intense SERS bands relative to those in the bulk-phase spectra are associated with vibrations of the carbon-carbon double or triple bonds. Attempts to examine SERS of absorbated acetylene were thwarted by a spontaneous surface reaction yielding a film of polyacetylene. GRA

N86-17504# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
THE ROLE OF SOLVENT REORGANIZATION DYNAMICS IN ELECTRON-TRANSFER PROCESSES. THEORY-EXPERIMENT COMPARISONS FOR ELECTROCHEMICAL AND HOMOGENEOUS ELECTRON EXCHANGE INVOLVING METALLOCENE REDOX COUPLES
T. Gennett, D. F. Milner, and M. J. Weaver Aug. 1985 38 p
(Contract N00014-79-C-0670)
(AD-A160034; TR-45) Avail: NTIS HC A03/MF A01 CSCL 07/4

Electrochemical Rate Constants and Activation Parameters are reported for the electron exchange of five metallocene couples and dibenzenechromium (I)/(O) in eight solvents at mercury electrodes. The solvents (acetonitrile, acetone, methylene chloride, formamide, N-methylformamide, N,N'-dimethylformamide, dimethylsulfoxide, and benzonitrile) were chosen so to provide substantial variations in their dynamical as well as dielectric properties. The metallocene couples are of the form M(Cp)2(+/o), where M = Fe, Co, or Mn, and Cp = cyclopentadiene or pentamethylcyclopentadiene. The inner-shell (i.e., bond distortional) barriers are calculated for the metallocene and arene couples from bond-distance and vibrational data to be small (< or approx, 0.25 kcal/mol) yet metal-dependent. Detailed comparisons of the observed solvent-dependent kinetics are made with the rate parameters calculated from contemporary theoretical treatments of outer-sphere electron transfer. Considerably better agreement between the experimental and theoretical kinetic parameters was obtained when the latter take into account the influence of solvent friction upon the barrier-crossing frequency. These results indicate that the conventional transition-state theory may not apply to electron-transfer reactions where the free-energy barrier is due chiefly to solvent reorganization, at least in high friction media where concerted solvent relaxation is slow. GRA

N86-17505# Oak Ridge National Lab., Tenn.
CORRELATIONS OF ACUTE TOXICITY OF METAL IONS AND THE COVALENT/IONIC CHARACTER OF THEIR BONDS
J. E. Turner, M. W. Williams, K. B. Jacobson, and B. E. Hingerty 1984 8 p refs Presented at the Symposium of QSAR in Toxicology and Xenobiochemistry, Praha, Czechoslovakia, 12 Sep. 1984
(Contract DE-AC05-84OR-21400)
(DE85-017094; CONF-8409263-1) Avail: NTIS HC A02/MF A01

We have investigated correlations between physiochemical properties of 24 metal ions and their acute toxicity in mice and Drosophila. A high correlation for a softness parameter suggests that the relative covalent/ionic character of the bonds formed by the metal ions may be important in determining their toxicity. This hypothesis is reinforced by model calculations of metal binding to dinucleotides in water. Since the nature of bonds depends on ligand electronegativity, we searched for correlations involving this parameter. Although electronegativity is useful for interpreting some aspects of metal ion behavior related to toxicity, it does not yield improved correlations. DOE

N86-17506# Denver Research Inst., Colo.
SAMPLE CONDITIONING AND STANDARD PREPARATION FOR SYNFUEL GAS ANALYSIS
J. R. Wallace and R. A. Nye Mar. 1985 25 p
(Contract DE-AS20-82LC-10845)
(DE85-010073; DOE/LC-10845/1828) Avail: NTIS HC A02/MF A01

A goal of the work carried out subsequent to the field test was thus to develop a method of collecting and conditioning a gas sample which obviated these concerns. The method was to avoid exposing the gas to any liquid condensate, and was to be insensitive to high loadings of suspended dust or droplets, and should not be affected by pressure fluctuations which inevitably occur in a process line. For this purpose a volumetric gas dilutor was developed. This system extracts a fixed volume of gas at constant pressure and temperature and dilutes it with another inert carrier gas. The critical component of this system was designed and tested in the laboratory as described in Section 2 of this report. Finally, a detailed design for a fieldworthy gas conditioning system was completed to the level of individual components and vendors. A summary of this design was provided to LETC in the June 1983 monthly report, but the system was not developed further. The volumetric dilution system also appears to be a valuable method for preparing gas standards in the range 0.1 ppM to ca. 20%. In much of this range the accuracy of this standard can be traceable to NBS standards. Dilution of a fluid by means of repetitive injections of a fixed volume into a diluent stream requires that the resulting concentration spikes be averaged over time. This chapter shows that a single mixing chamber is normally inadequate, but that a column of 5 to 20 plates or sub-volumes is optimum. DOE

N86-17507# Lawrence Livermore National Lab., Calif.
LEARNING ALGORITHMS IN THE INFRARED
T. Hirschfeld Jul. 1985 6 p Presented at the International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Ontario, 24 Jun. 1985
(Contract W-7405-eng-48)
(DE85-016441; UCRL-92444; CONF-8506118-4) Avail: NTIS HC A02/MF A01

The use of learning algorithms to automatically set up analytical procedures in the near IR leads to considerable statistical complexities when one attempts to refine and optimize the method. While current work employs an almost brute force approach using lots of signal/noise ratios, plenty of samples and well defined representative learning sample sets, backed up by plenty of trial and error research, vastly more efficient, more easily automated, and more reliable procedures are, in principle, possible. While no such complete understanding seems near at present (despite the overwhelming success of our so far crude approach to this spectroscopic technique), a number of insights derived from detailed considerations of the process will be discussed. These include procedures for avoiding optimization pitfalls, overall performance improvements exploiting the non-Gaussian error distribution of the results, simplified optimization routines, and procedures for internal data verification. DOE

N86-17508# Sandia National Labs., Albuquerque, N. Mex.
TOTAL NORMAL EMITTANCE MEASUREMENTS OF HIGHLY CONDUCTIVE, OPAQUE MATERIALS USING A SOLAR FURNACE
B. W. Marshall, Jr. and G. P. Mulholland 1985 4 p To be presented at the ASME Solar Energy Division Conference, Anaheim, Calif., 14 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE85-016578; SAND-85-1648C; CONF-860406-1) Avail: NTIS HC A02/MF A01

This paper presents a method of measuring the total normal emittance of two highly conductive opaque materials with and without selective surface coatings and at elevated temperatures. The purpose of this work was to develop a method of measuring the thermophysical properties of materials at elevated temperatures which are subjected to highly concentrated solar flux at the Central Receiver Test Facility (CRTF) at Sandia. A horizontal axis solar furnace located at the CRTF was used to heat the samples to temperatures ranging from 373 to 973 degrees K (100 degrees C, to 700 degrees C) with all tests conducted in air. A Kendall MK-VI radiometer consisting of a cavity-type radiometer and a control unit was used to measure the total normal emittance from the samples. The emittance measurements for both copper and aluminum at 373 degrees and 473(0)K were found to be unreliable because of relatively high drift in the cavity-type radiometer system compared to the emitted energy at these temperatures. However, total normal emittance measurements of these materials at 573 degrees and above compare favorably with trends of published data. DOE

N86-17509# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
RAMAN SPECTROSCOPIC STUDY OF MOLTEN SALT ELECTROLYSIS OF LIGHT METALS
S. Y. Yoon Jan. 1985 43 p
(Contract DE-FG07-82CE-40545)
(DE85-017480; DOE/CE-40545/9) Avail: NTIS HC A03/MF A01

Production of aluminum and magnesium by electrolysis of molten salts is studied with Raman spectroscopy. The I.G. process and aluminum chloride alkali chloride process were selected for the study. By measuring Raman spectra for the pure molten MgCl2 it was confirmed that the experimental set-up is correct. Magnesium and aluminum were confirmed to exist in their electrolyte melts as tetrahedrally coordinated species. Raman spectra for MgCl2 and AlCl3 during electrolysis showed that it can be used as a reference for concentration change. Some result for the AlCl3 electrolysis gave a clue to the problem of the occurrence of new species. DOE

N86-17510# Sandia National Labs., Albuquerque, N. Mex.
PHOTODECOMPOSITION OF Mo(CO)6 ADSORBED ON Si(100)
J. R. Creighton 1985 5 p
(Contract DE-AC04-76DP-00789)
(DE85-017818; SAND-85-2041C) Avail: NTIS HC A02/MF A01

The photochemical decomposition of Mo(CO)6 layers physisorbed on Si(100) was investigated to determine the feasibility of molybdenum deposition and also to examine the photochemical reaction mechanism and efficiency. Temperature programmed desorption (TPD) was used to investigate the interaction of Mo(CO)6 with the silicon surface before and after irradiation. Auger spectroscopy was used to determine surface elemental composition before Mo(CO)6 adsorption and after photodecomposition. DOE

N86-17511# Brookhaven National Lab., Upton, N. Y.
LOW TEMPERATURE METHANOL SYNTHESIS CATALYST AND PROCESS DEVELOPMENT
R. Sapienza, W. Slegeir, D. Mahajan, M. Foran, T. OHare, and G. Skaperdas Apr. 1985 18 p refs Presented at the 10th Annual EPRI Contractors Conference on Coal Liquefaction, Palo Alto, Calif.,

23 Apr. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017837; BNL-36733; CONF-8504130-3) Avail: NTIS HC A02/MF A01

A new catalyst system for synthesis of methanol has been conceived and tested on the laboratory scale by the Fuels and Catalysis Division of the Brookhaven National Laboratory. The catalyst system is made up of mutually soluble liquid components and its novel nature permits operation at remarkably mild conditions. Rapid conversion of synthesis gas has been obtained in laboratory tests at about 100(0)C and pressures ranging from 300 to below 100 pounds per square inch absolute. Patent applications on the catalyst system have been filed and are being processed. The advantages of low temperature operation due to the catalyst are considered. Since the presence of some nitrogen does not affect the process, the use of air-blown gasification is suggested for economic effects. The development of continuous reactors is underway. DOE

N86-17512# Paducah Gaseous Diffusion Plant, Ky.
SEPARATION OF A GAS FROM A GAS MIXTURE
R. Benoit, J. Machefer, J. Mauvisseau, and P. Plurien 1985 10 p Transl. into ENGLISH of German Patent Specification 2,843,416; 12 Apr. 1979 Prepared in cooperation with Commissariat a l'Energie Atomique, Paris, France
(Contract DE-AC05-84OU-21400)
(DE85-018296; KY/tr-85-1) Avail: NTIS HC A02/MF A01

A process is claimed for the separation of a gas from a gas mixture in which this gas is the easiest condensable gas of the gas mixture. The gas mixture is brought into contact with at least one microporous barrier having a permeability of 100 to 1000 moles of air/sq. cm./min/cmHg and a pore strength of 10 to 100 A, that the partial pressure of the easiest condensable gas and/or the temperature of the gas mixture as function of the mean diameter of the barrier pores are regulated in such a way that it results in a capillary condensation of the condensable gas at the entrance of the barrier pores and in an escape of the condensed gas through the pores and through the barrier and in the subsequent collection of the condensed gas. DOE

N86-17513# Main (Charles T.), Inc., New York, N.Y.
CHEMISTRY OF CARBONYL SULFIDE Final Report, 1 Jul. 1984 - 30 Jun. 1985
C. C. Hinckley, L. V. Dunkerton, and J. Tyrrell Sep. 1985 16 p refs
(Contract DE-FC22-83FE-60339)
(DE85-018430; DOE/FE-60339/T20) Avail: NTIS HC A02/MF A01

The preparation, characterization and reactivity of carbonyl sulfide (OCS) and its metal complexes continues to be a major objective of this research. The reactions of metallic compounds with the OCS are directed towards developing efficient regioselective oxidative addition reactions. Present efforts are concentrated on the use of OCS in carbon-carbon bond-forming reactions in the presence of aluminum catalysts. Calculations directed towards an understanding of bonding and reactivity of OCS with transition metals have focused on Ti, Ni, Pt, and Pd (OCS) complexes. Another objective of this research project was preparation of lanthanide monothiocarbamate complexes and examination of the properties of the substances. Additional results are now available for the reaction of OCS with the ene reaction substrate--methylenecyclohexane catalyzed by diethylaluminum chloride. A set of complete spectral data is provided for these reaction products, including high-resolution electron impact mass spectral data, low-resolution chemical ionization mass spectral data, both (1)H and (13)C FT-NMR spectral data, and FT-infrared spectral data. Ab initio effective core potential calculations on the systems Ti(OCS), Ni(OCS), and Pt(OCS) have been completed. Ab initio all-electron calculations on the systems Ti(OCS), Ni(OCS), and TiH4(OCS) have been completed. Optimum and equilibrium structures, as well as electron distributions, have been obtained in all cases. Major program modifications, including the addition of an effective core potential prgram modifications, including the addition of an effective core potential program allowing both relativistic and non-relativistic calculations on elements up through the third transition metal series, have been completed. DOE

N86-17514# California Univ., Santa Barbara. Dept. of Chemical and Nuclear Engineering.
REACTION ENHANCEMENT OF HETEROGENEOUSLY CATALYZED REACTIONS BY CONCENTRATION FORCING Technical Progress Report, 1 Sep. 1984 - 15 Jul. 1985
R. G. Rinker 15 Jul. 1985 18 p
(Contract DE-FG03-84ER-13300)
(DE86-000220; DOE/ER-13300/T1) Avail: NTIS HC A02/MF A01

Highlights of progress accomplished during the period of September 1, 1984 to July 15, 1985 are summarized. The following tasks were performed: (1) Developed a phenomenological model for the reaction sequences in ammonia synthesis at pressures up to 150 psia that permit us to correctly predict the conversion performance of reactors which operate either at steady state or under cyclic (transient) conditions resulting from variations in feed composition such as in concentration forcing. (2) Conducted theoretical studies, both analytical and numerical, on the behavior of adsorption/desorption (A/D) models with Eley-Rideal kinetic steps under forced-concentration operating conditions in distributed systems such as fixed-bed plug-flow reactors. (3) Upgraded the fixed-bed reactor system and made design changes so that it can operate at pressures up to 1000 psia for continued mechanistic and behavioral studies of ammonia synthesis as well as methanol synthesis under conditions of concentration forcing of the feed. (4) Completed construction of a novel annular gradientless reactor facility (lumped system) for studying methanol synthesis from CO and H2 at steady state and under concentration forcing conditions for pressures up to 700 psia and temperatures up to 250(0)C. DOE

N86-17515# Lawrence Livermore National Lab., Calif.
REMOTE AND IN-SITU ANALYSIS
T. Hirschfeld Jul. 1985 27 p refs Presented at the Instrument Society of America International Conference and Exhibit, Philadelphia, Pa., 21 Oct. 1985
(Contract W-7405-eng-48)
(DE85-017397; UCRL-92467; CONF-851045-2) Avail: NTIS HC A03/MF A01

As analysis continues to move out from the laboratory into the factory, the high cost of multiple on-line instruments and the conservative technology needed for unattended operation in a hostile environment have become serious limitations. Remote measurements, using selective optical sensors (optrodes) at the end of a fiber optic network operated by a single central instrument, are a solution to these problems. They allow the instrument to stay in the benign environment and high support level of the laboratory, while the low cost sensors can be multiplied to provide extensive and cost effective monitoring. A further trend, as yet in its infancy, is the movement of analytical and diagnostic capability out from the production line into the product. A number of low cost disposable sensors for this application will be described.DOE

N86-17516# Brookhaven National Lab., Upton, N. Y.
SURVEY OF CHEMICAL SPECIATION OF TRACE ELEMENTS USING SYNCHROTRON RADIATION
B. M. Gordon 1985 14 p refs Presented at the 2nd International Symposium on the Biology and Toxicology of Metals Using Nuclear Analytical Methods, Upton, N.Y., 20 May 1985
(Contract DE-AC02-76CH-00016)
(DE85-017850; BNL-36868; CONF-8505112-2) Avail: NTIS HC A02/MF A01

Information concerning the chemical state of trace elements in biological systems generally has not been available. Such information for toxic elements and metals in metalloproteins could prove extremely valuable in the elucidation of their metabolism and other biological processes. The shielding of core electrons by binding electrons affects the energy required for creating inner-shell holes. Furthermore, the molecular binding and the symmetry of

the local environment of an atom affect the absorption spectrum in the neighborhood of the absorption edge. X-ray absorption near-edge structure (XANES) using synchrotron radiation excitation can be used to provide chemical speciation information for trace elements at concentrations as low as 10 ppM. The structure and position of the absorption curve in the region of an edge can yield vital data about the local structure and oxidation state of the trace element in question. Data are most easily interpreted by comparing the observed edge structure and position with those of model compounds of the element covering the entire range of possible oxidation states. Examples of such analyses are reviewed. DOE

N86-17517# Argonne National Lab., Ill.
LASER SPECTROSCOPY OF SPUTTERED ATOMS
D. M. Gruen, M. J. Pellin, C. E. Young, and W. F. Calaway 1985 34 p refs Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-018388; CONF-851174-3) Avail: NTIS HC A03/MF A01

The use of laser radiation to study the sputtering process is of relatively recent origin. Much has been learned from this work about the basic physics of the sputtering process itself through measurements of velocity and excited state distributions of sputtered atoms and the effects of adsorbates on substrate sputtering yields. Furthermore, the identification, characterization, and sensitive detection of sputtered atoms by laser spectroscopy has led to the development of in situ diagnostics for impurity fluxes in the plasma edge regions of tokamaks and of ultrasensitive methods (ppB Fe in Si) for surface analysis with ultralow (picocoulomb) ion fluences. The techniques involved in this work, laser fluorescence and multiphoton resonance ionization spectroscopy, will be described and illustrations given of results achieved up to now. DOE

N86-17518# Institut Franco-Allemand de Recherches, St. Louis (France).
MEASUREMENTS OF THE TWO PHASE FLOW IN THE NEIGHBORHOOD OF THE EXHAUST OF A 7.62 MM CALIBER GUN [MESSUNGEN AN DER ZWEI-PHASENSTROEMUNG IM AUSSTROEMUNGSBEREICH EINES GEWEHRS VOM KALIBER 7.62 MM]
H. Mach, U. Werner, and H. Masur 7 Jun. 1984 109 p refs In GERMAN
(ISL-R-110/84) Avail: NTIS HC A06/MF A01

The exit domain of a type G3, 7.62 mm caliber gun was analyzed using IR emission and absorption spectroscopy, in order to study the behavior of particles and combustion gases such as H2O, CO2, CO, OH, and K as far as they are important for the gun flash. The IR spectrum is mainly dominated by CO2 and H2O. Parameters characterzing the two phase flow (concentration, temperature, velocity, relaxation time, and particle size distribution) were determined using extinction and scattered light measurements, laser Doppler velocimetry, and particle collection techniques. The results confirm theoretical models describing the flow structure, and show that in the pressure region a particle pyrolysis takes places with additional formation of CO2. Author (ESA)

N86-17519# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany). Abt. Waerme.
IGNITION BEHAVIOR OF SMALL HOT COMPONENTS IN FLAMMABLE ATMOSPHERES [ZUENDVERHALTEN KLEINER HEISSER BAUTEILE IN EXPLOSIONSFAEHIGER ATMOSPHAERE]
Dieter Markworth and Fritz Schebsdat Apr. 1985 34 p refs In GERMAN
(PTB-W-25; ISSN-0341-6739) Avail: NTIS HC A03/MF A01

The ignition behavior of small hot components was investigated in order to establish general safety criteria for industry. The measurements were performed using diethyl ether vapor/air mixtures, and sulfur carbon vapor/air mixtures which have very low ignition temperatures. The measured ignition temperatures are always higher then the values known from the test IEC 79-4. A relation between ignition temperature and the component surface and geometry is established, enabling a good assessment of the ignition behavior of small hot components. It is shown how groups consisting of a large number of such small components have to be treated. Author (ESA)

N86-17520# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
ULTRAVIOLET LASER-INDUCED PHOTOCONDENSATION IN THE BENZOL VAPOR PHASE Thesis [UV-LASER INDUZIERTE PHOTOKONDENSATION IN DER BENZOL-DAMPFPHASE]
M. Kauer Feb. 1985 83 p refs In GERMAN
(MPIS-4/1985; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22

Benzol was photolyzed with a pulsed excimer laser at 248 nm and the resulting aerosol formation was analyzed with light scattering. At pulse laser energies > 30 mJ/sqcm multiple photon absorption arises, and mainly acetylene is produced. At lower laser energies biphenyl and phenylcyclohexadiene dominate. The lower saturation vapor pressure of the last two and their relatively high yields are the origin of photocondensation. The influence of temperature, benzol concentration, laser energies, and pressure are determined. As a result of oversaturated biphenyl-phenylcyclohexadiene vapors, homogeneous nucleus formation with ensuing condensation and coagulation occur. The growth of particles is discussed. A program for the calculation of scattering and extinction cross sections is given. Author (ESA)

N86-17521# Centre d'Essais Aeronautique Toulouse (France). Lab. Chimie-Inflammabilite.
DOSE OF PES (PLASTICIZER) IN A BSL914 RESIN USING DIFFERENT STANDARDS [DOSAGE DU PES (PLASTIFIANT) D'UNE RESINE BSL 914 (REPERE CEAT C76) A PARTIR D'ETALONS DIVERS]
5 Sep. 1985 21 p In FRENCH
(CEAT-NT-15/M/85) Avail: NTIS HC A02/MF A01

In order to verify a polyether sulfone (PES) plasticizer analysis method, the analysis was repeated using different solvent gradient solutions prepared in different ways, to detect the possible influence of a polar pollution. The results show that in the case of the 914 resin associated to AS4 or T300 fibers, the absence of fiber-PES interactions assures the validity of this method.
Author (ESA)

N86-17430*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.
EXPLOSIVE DECOMPOSITION OF HYDRAZINE DUE TO RAPID GAS COMPRESSION
O. Briles (Sundstrand Corp., Rockford, Ill.), D. Hagemann (Sundstrand Corp., Rockford, Ill.), F. Benz, and T. Farkas (Rockwell International Corp., Downey, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 519-525 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 07C

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-17522 British Library Lending Div., Boston Spa (England).
ENHANCING THE IMPACT TOUGHNESS OF LOW ALLOY STEEL BY MICRO-ALLOYING AND MODIFICATION
V. I. Machikin, V. A. Kharchenko, and E. F. Dolzhenkova 1985 4 p ref Transl. into ENGLISH from Izv. VUZ Ch. Met. (USSR), no. 4, 1985 p 152-153
(BLL-M-36490-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The question of the replacement of the costly and difficult to obtain nickel in 10KhSND steel with a complex alloy and modification was examined. With optimization of the composition of the

steel the method of mathematical planning was employed -- a full factor experiment was carried out. the constants of composition were taken as: 0.12-0.15% C, 0.40-0.60% Si, 0.9-1.1% Cr, 0.015-0.040% Al, 0.01-0.04% Ti. The manganese content was varied from 0.8-1.6%, copper 0.2-0.6% calcium 0.003-0.008%. From the results of mechanical experiments the coefficients of regression were calculated, their statistical significance examined, and the adequacy of the model checked. The analysis of the equations showed that for the steel proposed as a replacement for 10KhSND, the most favorable composition is the following: 0.12-0.15% C, 1.21.6%Mn,0.45-0.65% Si,0.9-1.1% Cr, 0.4-0.6% Cu, 0.01-0.04% Ti, o.003-0.008% Ca, 0.015-0.040% Al. Author

N86-17523 British Library Lending Div., Boston Spa (England).
INFLUENCE OF BORON ON DENDRITE STRUCTURE OF CAST METAL
N. A. Manyak, L. K. Manyak, and V. V. Akulov 1985 4 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 4, 1985 p 153-154
(BLL-M-36491-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The few published works on the influence of boron on dendrite structure are of a qualitative nature. In the present work an effort was made to obtain a quantitative assessment of the influence of boron on the dendrite composition of cast metal. The investigations were carried out on O9G2 steel in the cast (slabs 150 x 1000mm in cross-section) and hot-rolled (16mm thick sheets) states. For the purpose of eliminating the influence of other processing factors, metal from the same heat was subjected to comparative investigation after partial casting; the boron content of the metal was 0.0035-0.0040%. The following parameters were determined: the average thickness of the dendrite axes S; the density of the dendrite structure (DDS) as the ratio of the volume occupied by dendrites to the volume of the interdendrite regions; the degree of dispersion of the dendrite structure (DDISP), i.e., the number of dendrite axes in lcm; calculations were carried out in columnar and equizxed regions using an Epiquant structural analyser in semiautomatic mode. G.L.C.

N86-17524 British Library Lending Div., Boston Spa (England).
POWDER METALLURGY: TECHNOLOGY AND EQUIPMENT
A. E. Vdovin 1985 4 p Transl. into ENGLISH from Stal (USSR), no. 2, 1985 p 85-86
(BLL-M-36380-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Attention is drawn to a forthcoming international powder metallurgy exhibition to be held in Minsk from 26th March to 3rd April 1985. At Powder Metallurgy '85 the latest developments in this rapidly developing field of metallurgy will be on show. The exhibition will provide Soviet and Foreign specialists with an excellent opportunity to strengthen existing ties and to establish new contacts for long-term collaboration in the powder metallurgy field. Author

N86-17525 British Library Lending Div., Boston Spa (England).
SHAPE AND DEPTH OF THE CRYSTALLISATION FRONT IN STEEL INGOTS REMELTED BY THE ELECTROSLAG METHOD DETERMINED WITH THE AID OF RADIOACTIVE PHOSPHORUS
31 Oct. 1985 16 p refs Transl. into ENGLISH from Metalurgia (Romania) v. 35, no. 7, 1982 p 308-312
(BLL-DRIC-T-Tr-7561-(3623.66)) Avail: British Library Lending Division, Boston Spa, Engl.

The new mode of labelling metallic baths with Cu32P, which in combination with the autoradiographic method makes it possible to obtain a visual record on special film (on a 1 : 1 scale), the shape and dimensions of the solification front, as well as the direction of growth of the crystals and their dimensions, as a function of the metal remelting and cooling parameters, and hence to study the crystallization mechanism and the types of defects appearing during the solification process and their causes is presented. The method is also of general interest for other types of investigations (of a direct applicative nature or for basic research) in the field of the solidification of metals and alloys, offering technologists and research workers the possibility of directing and controlling solidification processes. Author

N86-17526 Metals Society, London (England).
INFLUENCE OF CATALYTIC ADDITIONS ON FERRIC-OXIDE REDUCTION
Yu. S. Karabasov et al Sep. 1985 7 p ref Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (Moscow), no. 5, 1984 p 13-16
(BLL-BISI-23009-(9022.060)) Avail: British Library Lending Div., Boston Spa, Engl.: UK £14.25, Overseas $33.75

The mechanism of the catalytic influence of alkali compounds (sodium and potassium hydroxides) on the reduction processes is considered with ferric oxide as the example. From the experimental results obtained by differential thermal analysis and the investigation of adsorption and crystal-lattice parameters it is concluded that the influence is due to the action of the catalysts on the adsorption properties of the surface. Author

N86-17527 Metals Society, London (England).
THE BORIDING OF REFRACTORY METALS
H. Krzyminskii Sep. 1985 13 p Transl. into ENGLISH from Harterei-Tech. Mitt. (West Germany), v. 28, no. 2, 1973 p 100-104
(BLL-BISI-23037-(9022.060)) Avail: British Library Lending Div., Boston Spa, Engl.: UK £13.00, Overseas $30.00

Boriding, the diffusion of boron into metallic surfaces, is aimed at producing wear-resistant surface layers on suitably stressed components. The chemical and metallurgical aspects of this technique have been the object of basic research for a long time. Various methods for producing layers of boride have been investigated for this purpose. Most effort has been devoted to the treatment of ferrous materials. Only a few attempts have been made to boride nonferrous metals. A method for producing acceptable layers of boride on a series of refractory metals is described. The constitution and properties of layers produced by this method are also described. Author

N86-17528 Oxford Univ. (England). Dept. of Engineering Science.
THE EFFECT OF QUENCHING RATE ON THE TEMPERATURE AND STRAIN-RATE SENSITIVITY OF URANIUM 2w/o MOLYBDENUM ALLOY
G. A. C. Boyd, J. Harding, P. A. Bleasdale, K. Dunn, and G. I. Turner 1985 10 p refs Submitted for publication Sponsored by UK Ministry of Defence Procurement Executive
(OUEL-1577/85) Copyright. Avail: Issuing Activity

The mechanical properties of a U2w/oMo alloy in the gamma-quenched, fast-gas-cooled and as-extruded states are compared at tensile strain rates from 0.001 to 2000/sec. Significantly higher stress levels are observed in the gamma-quenched specimen. The cooling rate from the gamma-region does not significantly affect overall strain rate dependence of the flow stress, which, for all 3 materials, increases by 20% over the strain rate range. The gamma-quenched material, however, shows a markedly higher flow stress, by 30%, at all strain rates, probably because of its finer microstructure. Although each material shows a ductility minimum at 2/sec, no effect of strain rate on the overall fracture mode is detected. Failure is by initiation and coalescence of voids (forming preferably in the fast-gas-cooled and the as-extruded materials) at prior gamma-grain boundaries or other microstructural interfaces. For the gamma-quenched material, evidence supports work at quasi-static rates where the fracture path is unrelated to microstructural features. Author (ESA)

N86-17529 Newcastle-upon-Tyne Univ. (England). Dept. of Metallurgy and Engineering Materials.
STRESS CORROSION CRACKING OF 316 STAINLESS STEEL IN HIGH TEMPERATURE WATER Interim Report
J. Congleton and R. N. Parkins Jan. 1985 16 p refs
(Contract ARE-2043/080)
(BR94397) Copyright. Avail: Issuing Activity

The regions of water chemistry for oxygen containing, chlo-

ride doped high temperature water, in which annealed type 316 stainless steel is immune from cracking were studied. Serious cracking is likely to occur at applied potentials > 150 mV (she) in 265 C water or in contaminated water producing an open circuit potential > 150 mV (she). A multitude of short cracks form on specimens tested at 265 C in low oxygen contents or at potentials < minus 200 mV (she). It is not known whether these cracks are self arresting or whether growth can be sustained under cyclic loading or conditions of localized straining.
Author (ESA)

N86-17530# National Aeronautical Establishment, Ottawa (Ontario). Structures and Materials Lab.
HIGH TEMPERATURE OXIDATION AND HOT CORROSION OF NICKEL AND COBALT BASED SUPERALLOYS
P. C. Patnaik Oct. 1985 37 p refs
(NAE-AN-33; NRC-25075) Avail: NTIS HC A03/MF A01

Oxidation and hot corrosion are often the two most important modes of degradation that superalloys undergo in a high temperature gas turbine atmosphere. In general, the corrosion resistance of superalloys has been sacrificed to achieve adequate high temperature strength. Therefore turbine blade and vane materials are often protected from these modes of degradation by the use of protective coatings. Three classes of coating materials based on aluminizing, chromizing and more recently siliconizing treatments are usually considered due to their resistance to oxidation, sulfidation (hot corrosion) processes. The oxidation and hot corrosion properties of superalloys and coating materials of relevance to aero gas turbine engine hot-section are reviewed, with particular emphasis on the interaction between gas phase or molten salt deposits and the substrate alloy/coating system. Recent theories on these processes are reviewed. Finally, the effects of erosion on the corrosion properties of superalloys and coatings are also discussed. Author

N86-17531*# IIT Research Inst., Chicago, Ill.
CREEP-RUPTURE BEHAVIOR OF IRON SUPERALLOYS IN HIGH-PRESSURE HYDROGEN Final Report
S. Bhattacharyya and W. Peterman Dec. 1985 52 p refs
(Contracts DEN3-363; DE-AI01-77CS-51040)
(NASA-CR-175027; DOE/NASA/0363-1; NAS 1.26:175027; IITRI-M06136-9) Avail: NTIS HC A04/MF A01 CSCL 11F

The creep-rupture behavior of a newly developed cast alloy NASAUT 4G-Al with 15% Cr, 15% Mn, and 1.5% C was evaluated in 15 MPa H2 at 775 C and 825 C. The alloy is intended for automotive stirling heater head application. Rupture life, minimum creep rate, and time to 1% strain data were analyzed using the Orowan-Sherby-Dorn temperature compensated technique, and the 3500-h rupture life stress and stress to obtain 1% strain in 3500 h were estimated. The analyses indicated that 3500-h mean rupture stress at 775 C is 140 MPa, exceeding the design stress of 119 MPa. The predicted mean stress to 1% creep in 3500 h was 57.8 MPa and had a very wide scatter indicating a lack of reproducibility in the alloy structure. For a case alloy, NASAUT 4G-A1 indicated significant ductility with maximum elongation in the range of 6.0 to 13.6% at 775 C. Hydrogen did not seem to affect the stable carbides though some methane was noted in the chamber gas, presumably arising from chamber structural members of lesser stability. The microstructure contained some voids, pores, inclusions, and interdendritic separations, which caused the observed scatter in data. Author

N86-17532# Korrosionsinstitutet, Stockholm (Sweden).
THE CORROSION PROPERTIES OF ALUMINUM BRONZES: A LITERATURE REVIEW Abstract Only
Folke Eriksson 1985 4 p
(KIS-1985-3E) Avail: NTIS HC A02/MF A01

Aluminum bronzes have been little used in Sweden compared with other countries such as the USA, the UK, West Germany and France. Today there are two standardized cast alloys of aluminum bronze in Sweden, SS 14 57 10 type CuAl10Fe3 och SS 14 57 16 type CuAl10Fe5Ni5, but experience of their corrosion resistance is limited. This review of the literature was started at the Swedish Corrosion Institute in order to gain an increased knowledge of the corrosion properties of aluminum bronzes. The review starts with a general description of the properties and uses of aluminum bronzes, and of the different types of alloys and their metallography, which have a great influence on the corrosion properties. The majority of the fifty-five references in the review of the literature deal with the corrosion of aluminum bronzes in seawater. They deal, among other factors, with the effect of composition of the material, flow rate of the water, pollutions in the water, temperature, galvanic corrosion and marine growth.
Author

N86-17533# Yale Univ., New Haven, Conn.
ELECTROMAGNETIC WAVE INTERACTIONS WITH METALLIC MICROPARTICLES: EXPERIMENTS WITH FIBERS AND FLAKES Final Report, 1 Jan. 1982 - 31 Mar. 1985
R. K. Chang Jun. 1985 15 p
(Contract DAAG29-82-K-0040)
(AD-A158468; ARO-18567.25-PH) Avail: NTIS HC A02/MF A01 CSCL 11/6

Metallic microstructures affect the surface electromagnetic intensity and the charge transfer between the metal and molecular adsorbates. Surface enhanced Raman scattering research has been conducted to further understand these two basic enhancement mechanisms on electrodes, colloids, powder, and S-1 photocathodes. Dielectric microstructures also affect the electromagnetic intensity, particularly inside the medium. In the case of optical fibers and liquid droplets, distinct morphology-dependent resonances can occur at specific ratios of the circumference to wavelength (size parameters). At these resonances, a dielectric microstructure can be conceptualized as an optical cavity. Both linear and nonlinear laser scattering phenomena have been investigated when the monochromatic incident radiation and/or the broadband internally generated inelastic radiation are commensurate with these morphology dependent resonances. Laser emission and stimulated Raman scattering from individual micron-size droplets have been observed for the first time. Author (GRA)

N86-17534# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
THE MECHANICAL PROPERTY DATA BASE FROM A COOPERATIVE PROGRAM ON FIRST GENERATION PM (POWDER METALLURGY) ALUMINUMS Final Report, Jun. 1982 - Aug. 1984
G. J. Petrak and M. A. Malas Aug. 1985 316 p
(AF Proj. 2418)
(AD-A159779; AFWAL-TR-85-4052) Avail: NTIS HC A14/MF A01 CSCL 11/6

Development of a mechanical property data base on first generation P/M structural aluminum alloys is detailed. P/M aluminum alloys tested were 7091 forgings, 7090 forgings, IN9021 forgings, 7091 extrusions, 7090 extrusions, IN9021 extrusions, 7091 plates, 7090 plates, and 7091 sheets. Basic mechanical property data consisted of tension, compression, shear, bearing and fracture toughness. Fatigue data was developed for both smooth and notched specimens. Constant amplitude fatigue crack growth rate data were obtained for all materials and spectrum tests were performed on most products. Corrosion characteristics were also obtained. All data developed by the participants are detailed. Author (GRA)

N86-17535# General Electric Co., Philadelphia, Pa. Re-entry Systems Operation.
SELF-PROPAGATING REACTIONS FOR SYNTHESIS OF HIGH TEMPERATURE MATERIALS Final Report, Oct. 1983 - Sep. 1984
P. D. Zavitsanos and J. F. DAndrea Jun. 1985 102 p
(Contract DAAG46-83-C-0178; DA Proj. 1L2-63102-DO-71)
(AD-A159869; AMMRC-TR-85-15) Avail: NTIS HC A06/MF A01 CSCL 07/1

This effort was undertaken to investigate the basic aspects of the condensed phase titanium-boron reaction leading to the formation of high density and quality TiB2 under self-propagating

conditions. Candidate factors for controlling microstructure were addressed and were utilized as variables in series of runs which produced TiB2. The heat of formation of TiB2 was measured directly from the reacting elements in a modified bomb calorimeter; a change in entropy at 298F = 71.81 + or - 1.9 was determined which is sufficient to produce liquid TiB2 under adiabatic conditions. High density titanium diboride was prepared from elemental powders of titanium and boron through the self-propagation reaction process. By applying external pressure during the reaction period the product (TiB2) has been densified to 95 to 97% theoretical density. The microstructure and properties such as density, grain size, hardness, strength, toughness by indentation and modulus by elastic and sonic methods, are discussed as a function of variables such as starting stoichiometry, powder-particle size, mixing techniques and nucleation additives such as TiB2 powder.
Author (GRA)

N86-17536# Los Alamos National Lab., N. Mex.
HIGH STRAIN RATE DEFORMATION IN FCC METALS AND ALLOYS
P. S. Follansbee 1985 34 p Presented at Explomet '85: International Conference on Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena, Portland, Oreg., 28 Jul. - 1 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017533; LA-UR-85-3026; CONF-850770-8) Avail: NTIS HC A03/MF A01

The effect of strain rate, and particularly of high strain rates, on deformation mechanisms in materials is of fundamental interest to those who model and analyze dynamic loading. In many materials the strain rate sensitivity is known to increase dramatically when the strain rate is raised about approx. 100/s. This increase has been interpreted previously as a transmission in deformation mechanism from thermal activation control at low strain rate to dislocation drag control at high strain rate. In copper, copper-aluminum alloys and stainless steel, recent measurements have shown that the increased rate sensitivity found at high strain rates is not due to a transition in deformation mechanism but rather can be explained with standard thermal activation theory. These findings and their implications regarding the formulation of constitutive behavior will are presented. Author

N86-17537# Ames Lab., Iowa.
RARE EARTH CHEMICAL AND PHYSICAL METALLURGY
K. A. Gschneidner, Jr. 1985 6 p Presented at the International Conference on Rare Earth-Development and Applications, Beijing, China, 10 Sep. 1985
(Contract W-7405-eng-83)
(DE85-015536; IS-M-541; CONF-8509133-2) Avail: NTIS HC A02/MF A01

The current state of the rare earth field is reviewed in the areas of basic research, applied research and technology, and commerical utilization. The role of China and its influence, as viewed by an outsider, is briefly summarized. The quenching of spin fluctuations in exchange enhanced paramagnets is also reviewed.
DOE

N86-17538# California Univ., Berkeley. Lawrence Berkeley Lab.
HYPERFINE FIELDS IN Fe-Ni-X ALLOYS AND THEIR APPLICATION TO A STUDY OF TEMPERING OF 9NI STEEL
B. Fultz and J. W. Morris, Jr. Dec. 1984 53 p Presented at the International Chemical Congress of Pacific Basin Society, Honolulu, Hawaii, 16 Dec. 1984
(Contract DE-AC03-76SF-00098)
(DE85-011517; LBL-19369; CONF-841210-25) Avail: NTIS HC A04/MF A01

Hyperfine interactions due to solutes in Fe-Ni-X alloys were systematized, and interpreted with a model of linear response of hyperfine magnetic fields to magnetic moments. The effects of solutes on the (57)Fe hmf were used for chemical analysis of the austenite formed in 9Ni steel during tempering. Diffusion kinetics of the Ni and X solutes were found to play an important role in the formation of the austenite particles. DOE

N86-17539# Oak Ridge National Lab., Tenn.
COUPLED ELECTRON-NUCLEAR MAGNETISM AND NEUTRON DIFFRACTION
S. Kawarazaki and J. Arthur Jul. 1985 26 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Osaka Univ., Toyonaka (Japan)
(Contract DE-AC05-84OR-21400)
(DE85-016479; CONF-850871-5) Avail: NTIS HC A03/MF A01

It often occurs that, in a rare-earth compound having a singlet electronic ground state, a long-range magnetically ordered state is formed by coupling of the nuclear spins with the electrons through the hyperfine interaction, at millikelvin temperatures. Neutron scattering has been used to measure the details of the magnetization processes of both the electrons and the nuclear spins in the coupled state in PrSn3, HoVO4, and PrCu2. The polarized nuclear spins could be observed through spin dependent nuclear scattering by (141)Pr and (165)Ho. The experimental results for PrSn3 and HoVO4 can be explained very well based on mean field considerations. For PrCu2, a recent experiment indicates that a sinusoidal screw structure is realized simultaneously both in the electronic and nuclear spin systems of this material. DOE

N86-17540# Argonne National Lab., Ill.
DAMAGE-RATE GRADIENT EFFECTS ON RADIATION-INDUCED SEGREGATION AND PHASE STABILITY IN IRRADIATED ALLOYS
N. Q. Lam and P. R. Okamoto Jul. 1985 11 p Presented at the International Seminar on Solute Defect Interaction: Theory and Experiment, Kingston, Ontario, 5 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-016605; CONF-8508107-1) Avail: NTIS HC A02/MF A01

Recent studies have shown that significant compositional redistribution in irradiated alloys can be induced by the gradients in the atomic displacement rates resulting from nonuniform defect production, in addition to the commonly-observed solute segregation at defect sinks. This process gives rise to complex local phase transformations during light-ion bombardment or irradiation with focused electron beams in the high-voltage electron microscope. Results of our theoretical and experimental investigations of this phenomenon in Ni-Al and Ni-Si are discussed. The implications of the observed effect in a number of areas of materials science are assessed. DOE

N86-17541# SRI International Corp., Menlo Park, Calif.
INVESTIGATION OF ELECTROCHEMICAL CORROSION OF SEMICONDUCTORS Final Subcontract Report
K. W. Frese, Jr. and D. P. Summers Aug. 1985 49 p
(Contract DE-AC02-83CH-10093)
(DE85-016853; SERI/STR-211-2746) Avail: NTIS HC A03/MF A01

This final report describes the results for the sixth year of a research program concerning photoelectrochemical solar cells. Work for the first five years focused on the corrosion of semiconductors in electrolyte media. In the final phase, some different but related questions were considered: (1) adsorption and interface state properties of CdSe in alkaline sulfide media; and (2) electrodeposition of semiconductor thin films using the mass transport method of the rotating disk electrode. Impedance was measured on single-crystal n-CdSe electrodes in alkaline media. In the presence of NaOH, surface state densities were low. The flatband potential of n-CdSe was also measured as a function of sulfur-to-sulfide ratio. Cu, In, Se, Te, and Cd were electrodeposited with a rotating disk electrode. The stoichiometry of two elements in a binary semiconductor film was controlled by having appropriate concentrations in the electrolyte. Observed and calculated diffusion-controlled currents for CdTe deposition agreed within 1 to 2%. Results for CuInSe2 were not as good, probably because of insufficient cathodic bias. DOE

N86-17542# Oak Ridge National Lab., Tenn.
SURVEY OF PHYSICAL PROPERTY DATA FOR SEVERAL ALLOYS

R. E. Pawel and R. K. Williams Aug. 1985 40 p
(Contract DE-AC05-84OR-21400)
(DE85-018138; ORNL/TM-9616) Avail: NTIS HC A03/MF A01

This report summarizes an examination of physical property data available in the literature for six alloys of potential interest to the Toroidal Fusion Core Experiment in the Fusion Energy Program. The properties of thermal expansion, density, specific heat, electrical resistivity, and thermal conductivity were compiled for six alloys: Nitronic 33, a low-nickel, high manganese stainless steel; nickel-base Inconnel Alloys 625, 718, and X-750; and copper alloys C10400 and C17510. The temperatures of interest were 4-500 K for the Nitronic 33 and the Inconels, and 250-400 K for the copper alloys. Where data were lacking, estimates were made based on theory or comparisons with similar materials. DOE

N86-17543# Argonne National Lab., Ill.
INTERNAL FRICTION STUDY OF STRAIN AGING IN ALLOYS
R. B. Schwarz Jul. 1985 10 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation in Solids, Urbana, Ill., 3 Jun. 1985
(Contract W-31-109-eng-38)
(DE85-018367; CONF-8506125-10) Avail: NTIS HC A02/MF A01

Internal friction measurements were used to study strain aging in single crystals of Al-Mg and Cu-Al alloys as a function of temperature and aging time. In the absence of deformation-generated vacancies, solute segregation to dislocations starts at 200 and 300 K, respectively. Excess vacancies were generated in pure Al and Al-Mg alloys by in-situ plastic deformation at 120 K. With increasing temperature, solute segregation to dislocations starts in these alloys at 200 K, as in the absence of excess vacancies. The excess vacancies become mobile in pure Al and in the Al-Mg alloys at 250 K. It is concluded that the initial locking of dislocations by solutes occurs through a rearrangement of solutes near the dislocation cores and that in Al-Mg alloys, deformation-generated vacancies have little or no effect in this process. DOE

N86-17544# Pontifica Univ. Catolica do Rio de Janeiro (Brazil). Dept. de Engenharia Mecanica.
COMPARISON OF DIFFERENT ALGEBRAIC STRESS MODELS IN PREDICTING TEMPERATURE FLUCTUATIONS AND MEAN VELOCITY IN LIQUID-METALS
M. J. S. deLemos 1985 11 p Presented at the International Symposium on Refined Flow Modeling and Turbulence Measurements, Iowa City, Iowa, 16 Sep. 1985 Prepared in cooperation with Argonne National Lab., IL.
(Contract W-31-109-eng-38)
(DE85-018374; CONF-8509165-2) Avail: NTIS HC A02/MF A01

The present work consists of a numerical investigation comparing three algebraic stress closures for turbulence in predicting the variance of temperature fluctuations and mean velocity for flow of mercury. The models of Ljuboja and Rodi, Sha and Launder, and Lemos and Sesonske are used, as they handle differently the modeling of the dissipation rate of temperature fluctuations, and several terms in the algebraic equations for the turbulent fluxes. A sensitivity analysis on some constants of the latter model is also presented. Pipe flow with constant wall heat flux were the geometry and boundary condition. The range for Re was from 30000 to 60000, and the buoyancy parameter Ra/Re sq was varied from 10 to the -5 to 10 to the -4, where Ra is the Rayleigh number. The model of Lemos and Sesonske shows a substantial improvement in predicting temperature fluctuations, whereas predictions for the mean velocity show a weak dependence on the model used. Nevertheless, the model of Lemos and Sesonske gives results closer to available experimental data. DOE

N86-17545# Massachusetts Inst. of Tech., Brookhaven Station, N.Y. School of Chemical Engineering Practice.
LOCALIZED ELECTROCHEMICAL CORROSION OF NICKEL BASED ALLOYS
O. Oyeleye, M. Davidson, and D. Dudek Sep. 1984 74 p
(Contract DE-AC02-76CH-00016)
(DE86-000521; BNL-51910; MIT/BNL-84-3) Avail: NTIS HC A04/MF A01

The technique of monitoring open-circuit potential over time to study pitting corrosion of Alloy 600 was demonstrated at 95C. Chloride ion and oxygen levels were varied to determine the conditions required for pit initiation and propagation at 25C and 95C. Without applied potential pitting was not observed at 25C in solutions of up to 2.6 M NaCl. At 95C pit initiation occurred above 0.22 M NaCl for a nitrogen sparged system, 0.042 M NaCl for a contaminated air sparged system and 0.059 M for an O2 sparged system. At 95C pit initiation followed by propagation was observed at 0.22 M, 0.12 M and 0.11 M NaCl for the N2, air and O2 sparged systems, respectively. A theoretical model, using a hemispherical pit geometry and transport based on the Nernst-Einstein equation, was developed to predict changes in ion concentration, current and pit size. For a pit with an initial radius of 100 A, a fixed potential difference of 0.5 V and constant ionic diffusivities on the order of 10 to the minus 5 power/sq cm/sec, the model predicts that the solution within the pit will become saturated with metal chloride within 2 x to the minus 7 power seconds. The current density increases exponentially with time and reaches a maximum value of 7.2 x 10 to the 4th power A/sq cm at the point of saturation. DOE

N86-17546# Pacific Northwest Lab., Richland, Wash.
HEAVY METAL ALLOYS CONTAINING 30% TO 90% TUNGSTEN
W. E. Gurwell Jun. 1985 21 p refs Presented at the Annual Powder Metallurgy Conference, San Francisco, Calif., 14 Jul. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017896; PNL-SA-13071; CONF-850791-1) Avail: NTIS HC A02/MF A01

Tungsten-nickel-iron alloys containing 30% to 90% tungsten were rolled into sheet from billets produced by either liquid-phase or solid-state sintering. Compositions below 80% tungsten segregate during liquid-phase sintering. That is, gravity settling of the tungsten spheroids occurs, leaving a layer of matrix phase on top of the billet. For solid-state-sintered alloys in the annealed condition, impact toughness and tensile elongation were found to be directly related to the volume fraction of tough matrix phase. Liquid-phase-sintered alloys of 85% and 90% tungsten were tougher and more ductile than corresponding solid-state-sintered alloys. Ultimate strength of all annealed alloy was essentially the same, at about 120 ksi. All the alloys work harden rapidly during rolling and require frequent intermediate anneals. Solution-annealed 40% tungsten alloy was hardened by precipitation of a lamellar tungsten phase. Aging at 925(0)C for two hours increased hardness from 12 to 26 HRC. The aged alloy is tough, strong, and isotropic. An ultimate strength of 146 ksi and elongation of 32% were obtained. When the same alloy was cold rolled 30% after annealing, the ultimate strength was 164 ksi and elongation was 9%. DOE

N86-17547# Oak Ridge National Lab., Tenn.
RECENT DEVELOPMENTS CONCERNING SEGREGATION AND FRACTURE AT GRAIN BOUNDARIES
C. L. White 1985 22 p refs Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018106; CONF-851174-2) Avail: NTIS HC A02/MF A01

Certain trace impurities have long been known to embrittle grain boundaries in polycrystalline metals and alloys. In recent years a large body of evidence, directly connecting impurity segregation to intergranular failure, has become available. Indeed, it was conventional wisdom for a time that all intergranular failure could be attributed to segregation of embrittling impurities, and that all segregation degrades grain boundary cohesion. There have been several interesting experimental and theoretical developments during the last 5 to 10 years that run counter to this conventional wisdom, some of which may significantly advance our understanding of the mechanism by which impurities affect grain boundary cohesion. Several examples of beneficial grain boundary

segregants will be presented, and the relationship between segregation behavior and grain boundary cohesion will be discussed. DOE

N86-17548# Pacific Northwest Lab., Richland, Wash.
IRRADIATION EFFECTS ON SUBSTRUCTURE RELATED TO IRRADIATION SOFTENING
J. L. Brimhall and E. P. Simonen Apr. 1985 23 p Presented at the Workshop on the Relation Between Mechanical Properties and Micro-structure Under Fusion Irradiation Conditions, Ebeltoft, Denmark, 27 Jun. 1985
(Contract DE-AC06-76RL-01830)
(DE85-018224; PNL-SA-13194; CONF-8506165-3) Avail: NTIS HC A02/MF A01

The evolution of the dislocation microstructure during irradiation of a deformed Fe-2 1/4 Cr-1Mo ferritic alloy was characterized by two competing processes. At low temperature, the dislocation density increased due to loop formation and interaction. At higher temperature, the dislocation density decreased due to recovery and polygonization of the original tangled cell structure. The transition temperature which separates these two processes decreased with increasing degree of cold work. Radiation induced recovery of the deformation substructure was, however, only marginal compared to purely thermal-induced. The observed transition in microstructure with temperature correlated well with the transition from hardening at low temperatures to softening at high temperatures observed neutron irradiation. The dislocation evolution in cold-worked ferritic alloys is distant from that observed in cold worked austenitic alloys in that cold-worked or annealed starting conditions do not evolve to the same uniform dislocation density in the ferritic alloy as is observed in austenitic alloys. DOE

N86-17549# Rochester Univ., N. Y. Dept. of Mechanical Engineering.
DIFFUSIONAL CREEP OF MULTICOMPONENT SYSTEMS Final Report, 1 Feb. 1973 - 31 Jan. 1985
J. C.M. Li Apr. 1985 17 p
(Contract DE-AC02-76ER-02296)
(DE86-000184; DOE/ER-02296/30) Avail: NTIS HC A02/MF A01

Achievements are summarized in three areas: stressed solids, impression creep, and dislocation studies. DOE

N86-17550# Societe Creusot-Loire, Le Creusot (France). Centre de Recherches.
DEVELOPMENT OF A SINGLE PHASE SURFACE LAYER OF TIN ON STEEL [MISE AU POINT D'UN REVETEMENT MONOPHASE DE TIN SUR ACIER]
Y. Charbonniere Jun. 1983 63 p In FRENCH
(Rept-1570) Avail: NTIS HC A04/MF A01

The surface treatment by chemical vapor deposition to generate a TiN high performance layer on normal or stainless steels is described. The steel is first nitrided by ionic diffusion and then exposed to 950 to 1000 C during 10 hr in the presence of a NH4Cl gas flow and titanium spheres of < 5 mm diameter. Extremely high surface hardness is obtained (> 4400 Vickers) and thickness of 10 to 20 microns. Adherence problems exist in the case of stainless steel. Author (ESA)

N86-17551# Societe Creusot-Loire, Le Creusot (France). Centre de Recherches.
STUDY OF THE SURFACE HEAT TREATMENT OF CUTTING TOOLS AND SAMPLES OF GROOVED CYLINDERS MADE BY A LASER BEAM. COMPARISON WITH AN ELECTRON BEAM [ETUDE DU TRAITEMENT THERMIQUE SUPERFICIEL D'OUTILS DE TRANCHAGE ET D'ECHANTILLONS DE CYLINDRES CANNELLES PAR FAISCEAU LASER. COMPARAISON AVEC LE FAISCEAU D'ELECTRONS]
M. Bouix and R. Leveque Sep. 1983 67 p refs In FRENCH
(Rept-1578) Avail: NTIS HC A04/MF A01

Hardening surface treatments using laser or electron beams were explored on different types of steels. A CO2 laser that could be focused down to 0.3 mm was used. Hardened layers approaching 1 mm are obtained, with Vickers hardness levels of 850 with laser and 720 with electron beam. The results are not so good with high speed steels. Author (ESA)

N86-17552# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Laboratoire Techniques Nouvelles.
METALLURGICAL AND ASSEMBLING FATIGUE CHARACTERIZATION OF THE ALLOYS 2214T451, 7010T73651 AND 2024T351 IN PLATES (50 TO 70 MM, 120 TO 125 MM) AND IN THICK FORGED BARS [CARACTERISATION METALLURGIQUE ET EN FATIGUE D'ASSEMBLAGE DES ALLIAGES 2214T451, 7010T73651 ET 2024T351 EN TOLES (50 A 70 MM, 120 A 125 MM) ET FORGES-TRACTIONNES]
F. Gourcuff 8 Oct. 1984 117 p In FRENCH
(Contract STPA-81-96-027)
(DGT-25.919) Avail: NTIS HC A06/MF A01

Aluminum alloys for aeronautical application were tested in tensile fatigue and crack propagation tests. The 7010T73651 alloy, which is to be used in the A320 aircraft, shows good tempering and static properties and good damage tolerance. The other two alloys, which are thought of as alternatives to alloys in current application, are acceptable substitutes. Author (ESA)

N86-17553# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe.
SPECTRAL ANALYSIS AND METALLOGRAPHIC INVESTIGATIONS OF CORROSION AND PRECIPITATION PRODUCTS OF HIGH TEMPERATURE ALLOYS Thesis - Technische Hoschule, Aachen [SPEKTRALANALYTISCHE UND METALLKUNDLICHE UNTERSUCHUNGEN AN KORROSIONS- UND AUSSCHEIDUNGSPRODUKTEN VON HOCHTEMPERATURLEGIERUNGEN]
W. Mayer, M. Mazurkiewicz, and H. Nickel Feb. 1985 133 p refs In GERMAN; ENGLISH summary
(JUEL-1975; D-82; ISSN-0366-0885) Avail: NTIS HC A07/MF A01

The corrosion layers formed on samples of Inconel 617 and Incoloy 800 H in a synthetic process gas during different detention periods and a temperature range between 800 to 950 C were separated using an electrochemical procedure, and quantitatively analyzed. For the quantitative analysis of the corrosion products an inductively coupled plasma (ICP) was used as an excitation source for the spectroscopic analysis. The horizontal and vertical distribution of the line intensities and the matrix effects occurring during the analysis of the electrolyte solution were determined in inductively coupled N2/Ar and Ar/Ar-plasma systems. The ICP quantitative analysis data were compared with those of the metallographic postexamination of the formed corrosion layers as well as with the X-ray diffraction analysis and with microprobe measurements, showing that Inconel 617 and Incoloy 800 H have a parabolic growth law. Author (ESA)

N86-17554# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
DETERMINATION OF THE SUSCEPTIBILITY OF SILVER-PLATED COPPER WIRE/CABLE TO RED PLAGUE CORROSION
Jul. 1985 17 p refs
(ESA-PSS-01-720-Issue-1; ISSN-0379-4059) Avail: NTIS HC A02/MF A01

An accelerated screening test method to determine the suitability of silver-plated wire/cable materials, for use on ESA spacecraft and associated equipment is described. The test method, which also determines the suitability of the related fabrication processes, is based on the work of Anthony and Brown (1965). The environmental test system artificially promotes red plague corrosion under controlled laboratory conditions as a result of galvanic corrosion of the copper conductor core in locations where breaks or porosity exist in the silver plating. Author (ESA)

N86-17555# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes de Materiaux Metalliques.

INFLUENCE OF CORROSION PITS AND ENVIRONMENTAL MOISTURE ON THE FATIGUE BEHAVIOR OF 35 NCD 16 THR-ESR Test Report [INFLUENCE DE PIQURES DE CORROSION ET DE L'HUMIDITE AMBIANTE SUR LA TENUE EN FATIGUE DU 35NCD16 THR-ESR]

5 Aug. 1985 39 p In FRENCH
(M3-450900) Avail: NTIS HC A03/MF A01

Fatigue tests were carried out using cylindrical steel specimens of Kt = 1.035 at a frequency of 165 Hz. The corrosion was obtained by chemical attack. The pitted specimens show a reduction of 40% to 85% in the extrapolated stress for 10 million cycles. The noncorroded specimens show a similar reduction in fatigue life when exposed to a 95% moisture atmosphere.
Author (ESA)

N86-17556# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes et de Materiaux Metalliques.

STUDY OF THE INFLUENCE OF PITTING CORROSION ON THE FATIGUE CHARACTERISTICS OF MARVAC 18 Test Report [ETUDE DE L'INFLUENCE DE LA CORROSION PAR PIQURES SUR LA TENUE EN FATIGUE DU MARVAC 18]

5 Aug. 1985 49 p In FRENCH
(M2-666500) Avail: NTIS HC A03/MF A01

Fatigue tests were carried out in order to verify the effect of pitting corrosion found in a maraging steel of the Mirage 1 aircraft. The specimens were artificially corroded. Oligocyclic fatigue test conditions were ASTM CT 20 B specimens tested at 0.5 Hz frequency. The crack length was measured by the electric potential method. The results show a reduced fatigue life of as much as 1/10 of the original value for 0.002 to 0.003 mm pitting.
Author (ESA)

N86-17557# Centre Technique des Industries Mecaniques, St. Etienne (France).

APPLICATIONS OF MICROALLOYED STEELS TO STAMPING Final Report [APPLICATION DES ACIERS A DISPERSOIDES A L'ESTAMPAGE]

A. Durand Jun. 1985 71 p refs In FRENCH
(CETIM-13-K-301) Avail: NTIS HC A04/MF A01

The economic advantage of perlite formation during steel drawing, avoiding further heat treatment, is studied. The influence of the drawing ratio and drawing velocity are discussed. The lower cost and the low significance of drawing parameters allow the extension of this procedure to more complicated forging operations. A temperature of 500 or 600C could cause problems in forging, but solutions are possible. Microalloyed steels could be processed to obtain working loads of 1000 N/mmsq. Author (ESA)

N86-17558# Metallgesellschaft, A.G., Frankfurt am Main (West Germany). Metall-Lab.

PRESSING EFFECT AND STRESS CORROSION CRACKING OF AN EXTRUDED AlZnMgCu TYPE ALUMINUM ALLOY Final Report, Dec. 1983

Michael Renner and Peter Winclerz Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 92 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-087; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19.50

The effects of the texture and structure anisotropy of extruded AlZnMgCu aluminum alloys on the directional dependence of stress corrosion cracking were studied by testing rods with two different extrusion textures, and untextured material in hot hardening and cold conditions. The anisotropy of the mechanical properties and of the electrical conductivity are verified. Texture has little influence on the long duration creep rupture of the stress corrosion cracking. The directional dependence of the stress corrosion cracking behavior is explained with the anisotropy of matrix grains. Crack progress of embrittled grain boundaries through hydrogen is conditioned by the degree of complexity of the crack routes. Probes with greater width/thickness ratio have shorter duration due to the percentage of grain boundaries parallel to the stress direction. Author (ESA)

N86-17559# Krupp (Fried.) G.m.b.H., Essen (West Germany). Entwicklung Magnettechnik.

DEVELOPMENT OF COBALT-FREE HIGH GRADE PERMANENT MAGNETS ON THE BASIS OF MnAl ALLOYS Final Report, Jun. 1984

Wilhelm Ervens Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 99 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-099; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21

Economical procedures based on plastic deformation of MnAl alloys used as ferromagnetic materials with various preferred directions were developed for manufacture of anisotropic cobalt-free high grade permanent magnets. A test stand for adaptation and measurement of the procedure parameters and of the degree of deformation was designed. The magnet values depend on alloy composition, deformation procedure, and deformation rate, degree and temperature. Good magnet values are attained at 700 C. The extrusion procedure results in axially oriented magnets with the best magnet values, the compression procedure in radially oriented magnets. The stamping procedure allows the setting of preferred directions. The thermal aging behavior and the MnAlc alloy corrosion resistance was studied. The manufacture of anisotropic MnAlc magnets is costly and depends on the cobalt availability conditions. Author (ESA)

N86-17560# Centre Technique des Industries Mecaniques, Nantes (France).

INFLUENCE OF THE PRESENT PRACTICE OF HEAT STRAIGHTENING OF THICK STEEL PLATES (OVER 20 mm) ON THE MECHANICAL PROPERTIES Final Report [INFLUENCE DE LA PRATIQUE ACTUELLE DES CHAUDES DE RETRAIT SUR LES PROPRIETES MECANIQUES DE TOLES D'ACIERS D'EPAISSEUR SUPERIEURE A 20 MM]

R. Gaillard (Institut de Soudre) 27 Aug. 1985 48 p In FRENCH (Contract IS-83.1757)
(CETIM-100-840; IS-17-323) Avail: NTIS HC A03/MF A01

The influence on mechanical properties of use of heat to straighten or form thick steel plates was studied at maximum temperatures 1200, 1000 and 600 C. Local modifications of structure and hardness do not affect the general mechanical properties except for a nickel-vanadium alloy when subjected to the higher temperature ranges. Author (ESA)

N86-17561# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).

AMORPHOUS ALUMINUM HYDROXIDE GELS

A. C. Pierre and D. R. Uhlmann (MIT, Cambridge, Mass.) 1985 10 p refs Presented at a Conference, Montpellier, France, 12-14 Sep. 1985
(SNIAS-852-430-104) Avail: NTIS HC A02/MF A01

A model of the atomic structure of gels obtained from aluminum hydroxide sols is proposed. The sols are produced from aluminum-sec-butoxide in acidic media. The model is based on large angle X-ray diffraction and electron microscopy data. The model supposes a structure in which the bohemite planes are folded. The main interlayer peak would be rejected at small angles due to a large interlayer spacing, while the secondary peaks are wiped out due to the intercalation of water between the bohemite layers, which results in a first kind distortion. Author (ESA)

N86-17562# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).

GELATION OF ALUMINUM HYDROXIDE SOLS

A. C. Pierre and D. R. Uhlmann (MIT, Cambridge, Mass.) 16 Jan. 1985 43 p refs Presented at 85th Annual American Ceramics Society Meeting Submitted for publication
(SNIAS-852-430-19) Avail: NTIS HC A03/MF A01

The gelation of Al(OH)3 sols obtained from aluminum sec-butoxide is studied as a function of preparation conditions, including pH, temperature, and time of aging. A mechanism of gelation by the action of the anions of acids (NO3-) is proposed. Depending on temperature, it can lead to the building of extended Boehmite ribbons, an action favored by time, increasing anion content, decreasing water content. Below a given temperature it leads to the creation of polymeric structures trapping water to give a clear polymeric complex amorphous gel. Author (ESA)

N86-17563# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.

CHEMICAL AND MICROSTRUCTURAL EFFECTS ON THE DIFFUSIONAL CREEP BEHAVIOUR OF AISI TYPE 316 STAINLESS STEEL

C. M. Shepherd, A. W. James, and J. M. Titchmarsh Jun. 1985 48 p

(AERE-R-11322) Avail: NTIS HC A03/MF A01

The creep behavior of AISI type 316 steel was investigated at low stresses in the temperature range 650 C to 750 C. Specimens in the form of helical coils were used to examine the effects of temperature, grain size, composition and aging on the creep rates. The precipitate microstructures were examined in detail using transmission electron microscopy. At 650 C there was no effect of changing the carbon, phosphorus or tin contents of the steels. The grain size dependence of the creep rate was much weaker than that predicted by the Coble equation (which predicts an inverse cube relationship with grain size). At 750 C the creep rates for the unaged, phosphorus doped and high carbon materials were lower than those for the dependence remained as predicted. The importance of grain boundary particles, both intermetallic and carbides, in reducing the creep rate was shown, particularly at small grain sizes. Author

N86-17564# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.

THE INFLUENCE OF HEAT AFFECTED ZONE MICROSTRUCTURES ON THE DUCTILITY AND HYDROGEN EMBRITTLEMENT OF 9 PERCENT Cr 1 PERCENT Mo STEEL

N. P. Haworth (Sheffield City Polytechnic, England) and C. A. Hippsley Jun. 1985 50 p

(AERE-R-11473) Avail: NTIS HC A03/MF A01

The effects of internal hydrogen on the mechanical properties of a commercial 9% Cr 1% Mo steel were investigated. Studies were confined to three typical weld heat-affected-zone (H.A.Z.) microstructures in the air cooled and stress relieved conditions (dual phase, fully martensitic, and intercritical). Hydrogen was introduced into the material via an electrolytic charging process and conditions were obtained to simulate concentrations of hydrogen typically achieved during welding. The effect of hydrogen on mechanical properties was monitored via tensile testing and the fracture surfaces were examined using Scanning Electron Microscopy. The ductility of all H.A.Z. microstructures was reduced by internal hydrogen; the most pronounced effect was on material in the air cooled condition. Small quantities of delta-ferrite at grain boundaries proved to be most deletrious to the ductility of air cooled structures both before and after hydrogen charging. However, after stress relief, the fully martensitic structure was most susceptible to hydrogen embrittlement. Author

N86-17395*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

CORROSION OF METALS BY HYDRAZINE

E. A. Lawton, C. M. Moran, and S. DiStefano *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 145-153 refs (For primary document see N86-17380 08-20)

(Contract NAS7-918)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

N86-17396*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

THE EFFECTS OF SURFACE PRETREATMENT AND NITROGEN TETROXIDE PURIFICATION ON THE CORROSION RATE OF TYPE 304L STAINLESS STEEL

G. D. Blue and C. M. Moran *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 155-159 refs Sponsored in part by NASA and AF (For primary document see N86-17380 08-20)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

N86-17399# Ultramet, Pacoima, Calif.

OXIDATION RESISTANT COATINGS FOR REFRACTORY METALS

J. T. Harding, R. H. Tuffias, R. B. Kaplan, and Kurt Chandler (Air Force Rocket Propulsion Lab., Edwards AFB, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 181-187 refs (For primary document see N86-17380 08-20)

(Contract F04611-84-C-0043)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11/6

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-17565 Massachusetts Univ., Amherst.

STRUCTURE-PROPERTY STUDIES IN THE DEFORMATION OF SEMI-CRYSTALLINE POLYMERS Ph.D. Thesis

Hoe Hin Chuah 1985 243 p

Avail: Univ. Microfilms Order No. DA8517089

Drawing behavior of a high pressure crystallized chained-extended polyethylene in solid-state extrusion was studied. Because of the reduced trapped entanglements at the fold surfaces and interlamellar links in this morphology, there was insufficient continuity to provide stress transfer for effective orientation. Draw efficiency increases to a maximum of 0.71 when the polyethylene is crystallized at higher undercoolings. Tensile moduli are found to be a unique linear function of molecule draw ratio, measured by thermal shrinkage, independent of the initial morphology, draw temperatures and techniques. Electron microscopy of the fracture surface replicas at low draw shows the coexistence of undeformed, tilted, partially drawn lamellae and the generated fibrillar structure. The observations are consistent with Peterlin's model of plastic deformation. The question of melting and recrystallization during deformation is studied by small-angle X-ray scattering of the drawn chain-extended polyethylene. The results show that melting and recrystallization do not occur for this morphology. Author

N86-17566 Royal Armament Research and Development Establishment, Fort Halstead (England).

MELT PROCESSABLE LIQUID CRYSTAL POLYMERS. PART 1: A REVIEW OF CURRENT DEVELOPMENTS

R. L. Tickner, P. Q. Flower, and J. Roberts Nov. 1984 14 p refs

(RARDE-MEMO-50/84-Pt-1; BR93987) Avail: NTIS HC A02/MF A01

Melt processable polymers based on liquid crystal technology are described. Compared with conventional thermoplastics, the polymers offer marked advances in mechanical properties because of the extremely high levels of molecular orientation arising from their liquid crystal structure, combined with unusual rheological, electrical and magnetic properties. Low molecular weight liquid crystal materials, and developments in their polymeric counterparts are reviewed. Author (ESA)

N86-17567 Sussex Univ., Brighton (England). School of Chemistry and Molecular Sciences.

OXYLUMINESCENCE STUDY OF THE DEGRADATION OF FILLED AND UNFILLED RUBBERS Final Report

N. C. Billingham and F. McCapra Dec. 1984 48 p refs
(Contract MOD-D/ER1/9/4/2120/046-AMTE-HH)
(BR94542) Avail: Issuing Activity

The measurement of extremely low levels of light accompanying the degradation of polymers in oxygen (oxyluminescence) to monitor aging in fabricated materials and predict lifetimes is discussed. Measurements on the emission from rubber samples, before and after vulcanization and in the presence of white and black fillers are described. Results show that it is possible to obtain useful data even from samples heavily filled with carbon black and that there is a correlation with aging and history of the samples. There is a consistent pattern in the way in which the oxyluminescence changes with sample aging. Author (ESA)

N86-17568# Korrosionsinstitutet, Stockholm (Sweden).
PLASTICS AND RUBBER IN DIFFERENT CHEMICAL ENVIRONMENTS: A SURVEY OF THEIR RESISTANCE TO CORROSION Abetract Only
Gunnar Bergman 1985 2 p
(KIS-1985-2E) Avail: NTIS HC A02/MF A01

Summarized in handbook form are the corrosion properties of some 20 main types of plastics and some 10 or so types of rubber. It is based on surveys made in the pulp and paper industry, searches in the literature, perusal of suppliers' information about materials, and the experience of the author and the working group of technicians from industry who are engaged in the work of the Swedish Corrosion Institute in the polymer field. Author

N86-17569# Kentucky Univ., Lexington. Dept. of Chemistry.
POLYNUCLEAR PYRAZOLYL-BRIDGED SPIRO SPECIES CONTAINING BORON AND METAL CENTERS Interim Technical Report
J. Bielawski, T. G. Hodgkins, W. J. Layton, K. Niedenzu, and P. M. Niedenzu Oct. 1985 21 p
(Contract N00014-83-K-0611)
(AD-A159847; UK/DC/TR-10) Avail: NTIS HC A02/MF A01 CSCL 07/3

A series of chain-type polynuclear pyrazolyl-bridged spiro species containing boron and metal centers has been prepared. Reaction of the tetrakis(1-pyrazolyl)borate ion, B(pz)4(Hpz = pyrazole), with one molar equivalent of a metal halide species LMX (L = nonreactive ligands(s); M = metal, e.g., Pd; X = halogen) yielded covalent compounds of the type (pz)2Bmu-pz2ML; and with two molar equivalents of LMX, trinuclear cationic species of the type LM(micron-pz)2B(micron-pz)2ML+ were obtained. Corresponding reactions using B-di(1-pyrazolyl)pyrazaboles gave the trinuclear R2Bmu-pz)2B(micron-pz)2ML+ (r = non-coordinating substituent) and tetranuclear LM(mu-Pz)2B(micron-pz) 2ML2(+) ions, respectively. Reaction of metal dihalides, MX2 (e.g., M = Zn, Pd, Pt), with B-(1-pyrazolyl)pyrazaboles yielded species of the types R2B(micron-pz)2B(micron-pz)2BMX2 and X2M(micron-pz)2B(micron-pz)2B(micron-pz)2M X2. In addition, the pentanuclear compound C12ZnB(micmicron-pz) 2B(micron-pz) 2Zn(micron-pz)2B (micron-pz)2ZnC12 was obtained from ZnB(pz)4 and ZnCl2.
Author (GRA)

N86-17570# Oak Ridge National Lab., Tenn.
PLUTONIUM(4) HYDROUS POLYMER CHEMISTRY
L. M. Toth and K. E. Dodson 1985 6 p refs Presented at the Annual Meeting of the American Nuclear Society, Boston, Mass., 9 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016594; CONF-850610-43) Avail: NTIS HC A02/MF A01

The hydrous polymer chemistry of Pu(IV) in aqueous nitric acid solutions has been a subject of considerable interest for several years. This interest stems mainly from the fact that most nuclear fuel reprocessing schemes based on the Purex process can be hampered by the occurrence of polymer. As a result, an understanding and control of the parameters that affect polymer formation during reprocessing are studied. DOE

N86-17571# Lawrence Livermore National Lab., Calif.
CALCULATING THE VULNERABILITY OF SYNTHETIC POLYMERS TO AUTOIGNITION DURING NUCLEAR FLASH Final Report
R. Hickman and T. Reitter 1985 31 p refs
(DE85-016649; UCRL-53545) Avail: NTIS HC A03/MF A01

The purpose of our investigation was to determine if the rapid progression of fire to flashover conditions in a furnished room, observed in a 1953 nuclear weapons test at the Nevada Test Site (the Encore Event), might be typical behavior rather than an aberration. We placed special emphasis on fires that occurred in modern rooms, i.e., ones furnished with upholstery and drapery materials made from synthetic polymers. Examination of photochemical processes showed them to be an unlikely explanation. Out unlikel explanation. Our calculation of rapid radiant-heating behavior of a few materials demonstrated that fabrics and fabric-covered foams would exceed their autoignition temperature when exposed to a 25-cal/sq. cm. fluence from a 1-Mt air burst weapon. Because synthetic polymers have higher heating values and release heat faster during combustion than do the cellulosics used in the Encore experiment, early flashover should not be unexpected in contemporary households. However, the far-field thermal fluence required would be higher because of the absorption of thermal energy by windows and window coverings. Because of the complexity of the problem, carefully planned, full-scale experiments will be needed to finally answer the question. DOE

N86-17572# Materials Consultant Associates, Inc., Pickens, S.C.
CHEMICALLY BONDED CERAMIC MATERIALS FOR USE IN THERMAL ENERGY STORAGE DEVICES
D. A. Brosnan Aug. 1985 67 p
(Contract DE-AC05-84OR-21400)
(DE85-018078; ORNL/Sub-81-16953/1) Avail: NTIS HC A04/MF A01

Calcium aluminate cement and sodium polyphosphate bonded refractory concretes, i.e., castables, based on North Carolina olivine aggregates were developed for use in electric off peak or night storage heaters. The calcium aluminate cement bonded concretes exhibited no deterioration after 50 thermal cycles in a 15 kW room size storage heater. These cement bonded castables are limited to use below 1200(0)C when using the high iron (oxide) cements. The phosphate bonded concretes exhibited limited thermal shock damage after 50 thermal cycles, but this damage might be acceptable in storage core zones where temperatures exceed 1200(0)C due to the high refractoriness of the phosphate bonded compositions. Additions of high specific gravity minerals such as magnetite increased the bulk density of the concrete to equal that of conventionally fired (sintered) olivine brick. The performance of the storage heater with castable core components was similar to the heater's performance with a core constructed of conventionally fired brick. Concrete sections were cast directly about the heater's resistive elements without any deterioration of the concrete or effect on the heater's performance. These results demonstrate that simple concrete casting and curing steps can be employed to produce storage heater cores and that significant cost savings can be realized by using olivine concretes in storage devices as compared to the use of conventionally fired brick. DOE

N86-17573# Argonne National Lab., Ill.
CHEMICAL CHARACTERIZATION OF POLYETHYLENE RESINS AND POLYETHYLENE GAS PIPE
L. A. Raphaelian and D. G. Ettinger 1985 15 p Presented at the 9th Plastic Fuel Gas Pipe Symposium, New Orleans, La., 12 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-018346; CONF-851158-2) Avail: NTIS HC A02/MF A01

Three analytical techniques were used in this study to characterize chemically commercial polyethylene pipe samples: carbon-13 nuclear magnetic resonance (C-13 NMR) for looking at branching in the polyethylene, gas chromatography/mass spectrometry (GC/MS) for characterizing some of the low molecular weight components of polyethylene gas pipe, and X-ray diffraction (XRD) for determining the degree of crystallite orientation and crystallite size of the polyethylene within the polyethylene pipe matrix. Results are discussed. DOE

N86-17574# Centre Technique des Industries Mecaniques, Nantes (France).
STUDY ON THE MEASURING OF POLYMER RHEOLOGICAL PROPERTIES BY ADAPTING AN INJECTION MOLDING MACHINE Final Report [ETUDE D'UN MONTAGE D'ATELIER PERMETTANT D'OBTENIR LES COURBES RHEOLOGIQUES DES POLYMERS A L'AIDE D'UNE PRESSE A INJECTER]
M. Brierre 13 Feb. 1985 39 p refs In FRENCH
(CETIM-5-650-06) Avail: NTIS HC A03/MF A01

The theoretical and experimental study resulted in the development of the equivalent of a capillary viscometer adaptable to the output end of an injection molding machine. Two pressure meters and one thermocouple are used and its indications are continuously recorded. Faster and more reliable results are claimed. Data and curves obtained using a polystyrene polymer are presented.
Author (ESA)

N86-17575# Centre Technique des Industries Mecaniques, Senlis (France).
MODIFICATION OF VULCANIZED ELASTOMER SURFACES TO DIMINISH ADHERENCE TO METALS Final Report [MODIFICATION DE L'ETAT DE SURFACE D'ELASTOMERS VULCANISES EN VUE DE DIMINUER LEUR ADHERENCE AUX METAUX]
Heraud, Jahier, Papirer, and Schultz Nov. 1984 60 p refs In FRENCH
(Contracts DRET-82-S-0937; DRET-82-S-0938; DRET-82-S-0939) (CETIM-100340) Avail: NTIS HC A04/MF A01

Surface treatments to diminish surface adhesivity were explored in order to avoid utilization problems in mechanical assemblies such as valves, gaskets and pistons. Adhesion models are reviewed including the electric, wetting, rheological, and chemical adhesion models. Surface chemical treatments explored included fluor injection by low temperature plasmas, peroxide crosslinking, organomagnesium treatment, and SZC washing. The plasma treatment combines a reduction of the adherence with a conservation of the elastomer bulk properties. Author (ESA)

N86-17576# Centre Technique des Industries Mecaniques, St. Etienne (France).
THE HARDENING OF TECHNICAL ADHESIVES Final Report [MOYENS DE DURCISSEMENT DES ADHESIFS TECHNIQUES]
J. Zirah May 1985 68 p In FRENCH
(CETIM-101370) Avail: NTIS HC A04/MF A01

Industrial procedures to obtain the hardening of adhesives are reviewed. Direct heating, vapor phase heating, fluidized bed oven, pressure heating, thermoreactive heating, infrared effects, magnetic induction, dielectric heating, ultraviolet hardening, and beta radiation hardening of epoxy resins, polyurethanes, phenolics and polyimide resins are discussed. Author (ESA)

N86-17577# Elektroschmelzwerk Kenpten G.m.b.H., Munich (West Germany).
DEVELOPMENT OF SILICON NITRIDE MATERIALS FOR CASTING OF SOLAR CELL SILICON Final Report, Sep. 1984
Klaus Hunold and Peter Matje Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985 56 p refs In GERMAN; ENGLISH summary Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-069; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

High-purity reaction bonded sintered cast materials were developed. Small grain sized silicon powders with a small amount of impurities, comparable to that of the starting powder, were produced by grinding and acid treatment of very pure silicon. Test samples and crucibles were formed by cold isostatic pressing and by slip casting. In both cases there were difficulties in the forming of larger crucibles. Test samples and crucibles of silicon powders of different grain size and purity and of Si/Si3N4-mixtures were nitrited. The degree of reaction is up to 98% with densities up to 2.80 g/cub cm. Laboratory tests show good results, but tests with larger crucibles by customers are not always satisfactory.
Author (ESA)

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-17578# Midwest Research Inst., Golden, Colo.
ECONOMIC CONTRIBUTION OF LIGNINS TO ETHANOL PRODUCTION FROM BIOMASS
H. L. Chum, S. K. Parker, D. A. Feinberg, J. D. Wright, P. A. Rice, S. A. Sinclair, and W. G. Glasser May 1985 102 p refs
(Contract DE-AC02-83CH-10093)
(DE85-008814; SERI/TR-231-2488) Avail: NTIS HC A06/MF A01

Lignin, one of the three major polymeric components of biomass (16% to 33% by weight in wood), has the highest specific heat content. Therefore, it can be burned for process fuel. Compared to coal, its fuel value is 2.2 cents/lb. This report investigates markets for lignin utilization of higher value. After lignin isolation from the process, purchase of replacement fuel (coal was analyzed), lignin sale for the manufacture of solid materials or higher value octane enhancers was evaluated. Polymeric applications evaluated were: surfactants, asphalt, carbon black, adhesives, and lignin plastics; agricultural applications were briefly reviewed. These lignins would generate coproduct credits of 25 cents to 150 cents/gallon of ethanol respectively for 7.5 cents to 60 cents/lb lignin value (isolation and eventual modification costs were taken into account). Overall markets for these polymeric applications were projected at 11 billion lb/year by the year 2000. These projections are intensities of demand and not actual shipments of lignins. In addition, this report investigates the possibility of converting lignins into mixtures of methyls aryl ethers and methyl substituted-aryl ethers which are high value octane enhancers, fully compatible with gasoline. The report intends to show that if fuel ethanol production in the billions of gallons scale occurs lignin markets would not be saturated. DOE

N86-17579# Research Inst. of National Defence, Umea (Sweden).
MICROBIAL PROBLEM WITH STORAGE OF JET FUEL IN ROCK CAVERNS: DEVELOPMENT OF A PROCESS FOR PURIFICATION OF CORROSIVE JET FUEL
Roger Roffey Jun. 1985 97 p refs In SWEDISH; ENGLISH summary
(FOA-A-40051-B4; ISSN-0281-0220) Avail: NTIS HC A05/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 100

Literature concerning fuel desulfurizing is summarized and investigations on the use of compounds for purifying jet fuel by extraction or adsorption are reviewed. A process for the desulfurizing of a corrosive fuel with a high elemental sulfur content (1 to 5 mg/l) based on the use of powdered silver as adsorbant is described; adsorption capacity, and data for a full-scale compact plant (100 to 300 cub m fuel/hr), constructed as a mobile unit, enabling it to be transported to storage plants, are given. Cost estimates based on a silver consumption of 14 g per cub m fuel are presented. Author (ESA)

N86-17580# Societe Nationale des Poudres et Explosifs, Vert-Le-Petit (France). Groupe Technique Poudres.
VISUALIZATION OF INTERIOR BALLISTIC PHENOMENA [VISUALISATION DES PHENOMENES DE BALISTIQUE INTERIEURE]
Herve Houdard, Michel Nicolas, and Jean Louis Paulin 11 Apr. 1985 26 p refs In FRENCH Presented at 8th International Ballistics Symposium, Orlando, Fla., 23-25 Oct. 1984
(Contract DRET-82-226; DRET-83-177)
(SNPE-NT-27/85/CRB/NP) Avail: NTIS HC A03/MF A01

A 3 mm aircraft gun was simulated using a model entirely manufactured in composite materials such as glass fibers and epoxy resins. The maximum pressure of 300 MPa, powder and projectile masses, and outlet velocity are the same as those of

the real gun. The choice of composite materials permitted the obtaining of X-ray images of the phenomena occurring inside the gun. The photographs show that this method is appropriate to visualize interior phenomena. Author (ESA)

N86-17581# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
A REFERENCE SURVEY OF PYROLYSIS OF EXPLOSIVES
Annika Forsbeck Aug. 1985 63 p refs In SWEDISH; ENGLISH summary
(FOA-C-20580-D1; ISSN-0347-3694) Avail: NTIS HC A04/MF A01

Models which can predict critical temperature and time to explosion for different sizes and shapes of energetic materials are examined. Spontaneous initiation for different geometries (Semenov and Frank-Kamenetskii); comparison between numerical analyzing and experimental data; numerical models for enclosed explosives; tests with a nonenclosed spherical explosive; initiation with the an electronic beam or an incandescent wire; laser initiation; kinetics of exothermic reactions; solid phase kinetics; correspondance between kinetic data and theoretical equations; and Arrhenius parameters are reviewed. Author (ESA)

N86-17383# United Technologies Corp., San Jose, Calif. Chemical Systems Div.
CRACKED BALLISTIC GRAIN TESTS AND ANALYSIS
E. C. Francis and W. L. Hufferd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 19-36 refs (For primary document see N86-17380 08-20)
(Contract DAAH01-82-C-A121)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17389# Hughes Aircraft Co., Canoga Park, Calif. Missile Systems Group.
FAST COOK-OFF TESTS OF THE AMRAAM AIR VEHICLE
G. W. Cox and R. Sharma *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 89-97 (For primary document see N86-17380 08-20)
(Contract F08635-82-C-0001)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17390# Morton Thiokol, Brigham City, Utah.
FACTORS AFFECTING PI SUB k IN HTPB FORMULATIONS
M. M. Roland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 99-105 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17392# Westinghouse Electric Corp., Sunnyvale, Calif.
MOONBURNER: AN ULTRA-HIGH WEB FRACTION GRAIN DESIGN
William M. Wood *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 123-130 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17402# Lawrence Livermore National Lab., Calif.
INITIAL RESULTS FOR THE FAILURE STRENGTH OF A LOVA GUN PROPELLANT AT HIGH PRESSURES AND VARIOUS STRAIN RATES
Marc Costantino and Donald Ornellas *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 213-227 Sponsored in part by Army (For primary document see N86-17380 08-20)
(Contract W-7405-eng-48)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17465# Christian Rovsing Ltd., Copenhagen (Denmark).
DESIGN AND DEVELOPMENT OF A PYROTECHNIQUE ARMING AND FIRING UNIT
M. Heisel and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 287-293 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-17582# Brookhaven National Lab., Upton, N. Y.
SPUTTER DEPOSITION SYSTEM FOR CONTROLLED FABRICATION OF MULTILAYERS
R. P. DiNardo, P. Z. Takacs, C. F. Majkrzak, and P. M. Stefan Jun. 1985 7 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017521; BNL-36742; CONF-850887-28) Avail: NTIS HC A02/MF A01

A detailed description of a sputter deposition system constructed specifically for the fabrication of X-ray and neutron multilayer monochromators and supermirrors is given. One of the principal design criteria is to maintain precise control of film thickness and uniformity over large substrate areas. Regulation of critical system parameters is fully automated so that response to feedback control information is rapid and complicated layer thickness sequences can be deposited accurately and efficiently. The use of either dc or RF magnetron sources makes it possible to satisfy the diverse material requirements of both X-ray and neutron optics. DOE

N86-17583# Los Alamos National Lab., N. Mex.
EXPERIMENTAL RESULTS ON A LOW-TEMPERATURE MAGNETIC REFRIGERATOR
J. A. Barclay, W. F. Stewart, W. C. Overton, R. J. Candler, and O. D. Harkleroad 1985 11 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017541; LA-UR-85-2987; CONF-850814-5) Avail: NTIS HC A02/MF A01

A Carnot-cycle magnetic refrigerator has been designed, built, and tested in the temperature range of approx. 4 K to approx. 15 K. Gadolinium gallium garnet in the rim of a wheel is the refrigerant. The wheel rim rotates through a gap between two superconducting Helmholtz coils that produce a magnetic field of up to 6 T. Helium gas is used as the heat-transfer fluid in the hot and cold regions of the wheel. The refrigerator performance has been measured in an open-cycle flow system because no suitable low-temperature helium gas pumps were available for closed loop circulation of helium gas. Over one watt of cooling power with a temperature span of several degrees was achieved. At low frequencies the cooling power and temperature changes of the refrigerator match the entropy-temperature data used in the design. Problems associated with friction and gas mixing limit the performance at frequencies above about 0.1 Hz. Separate friction measurements suggest that gas flow control is the dominant problem that needs to be solved before significant improvement in refrigerator operation can be expected. The present measured efficiency is about 20% of Carnot if the drive motor efficiency is ignored. With friction and other losses in the drive motor mechanism, the overall efficiency is approx. 1% of Carnot. DOE

N86-17584# Brookhaven National Lab., Upton, N. Y.
OPERATIONAL TESTS OF THE BNL 24.8 kW, 3.8 K HELIUM REFRIGERATOR
D. P. Brown, Y. Farah, R. J. Gibbs, A. P. Schlafke, J. H. Sondericker, K. C. Wu, M. Freeman, V. Ganni, R. Kowalski, and R. McWilliams

1985 8 p refs Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with Koch Process Systems, Westborough, MA.
(Contract DE-AC02-76CH-00016)
(DE85-017851; BNL-36949; CONF-850814-9) Avail: NTIS HC A02/MF A01

The BNL 24.8 kW refrigeration system is completely installed and major portions of the acceptance tests have been completed. So far, the equipment tested has performed at or above design levels. The room temperature helium compressor station has been completely tested and accepted. The two-stage oil injected screw compressor system exhibited an isothermal efficiency of 57% while delivering a helium flow in excess of 4400 g/s. Data on the performance of the make-up gas cryogenic purifier is given. The refrigerator turbomachinery, 13 expanders and three cold compressors, has been tested at room temperature for mechanical integrity and control stability. The first cooldown to operating temperature will be attempted in late August, 1985. DOE

N86-17585# Oak Ridge National Lab., Tenn.
CORROSION OF MATERIALS IN ABSORPTION HEATING AND REFRIGERATION FLUIDS
J. C. Griess, J. H. DeVan, and H. PerezBlanco Jun. 1985 15 p refs
(Contract DE-AC05-84OR-21400)
(DE85-018140; ORNL/TM-9646) Avail: NTIS HC A02/MF A01

The corrosion of metals and alloys in absorption refrigeration fluids has received little attention except for the behavior of steel and copper alloys in aqueous lithium bromide solutions. This report presents results of short-term corrosion tests on several materials in lithium bromide solutions as well as in other fluids of potential interest in advanced absorption machines. All materials tested had extremely high resistance to organic fluids, but in the aqueous systems some of the materials underwent localized attack. Type 304 stainless steel had acceptable corrosion resistance in most environments, but it underwent stress corrosion cracking in oxygen- or chromate-containing lithium bromide and even in the unstressed condition was subject to intergranular attack in hot concentrated caustic solutions. DOE

N86-17586# Societe Creusot-Loire, Le Creusot (France).
DEVELOPMENT OF A MANUFACTURING PROCEDURE TO PRODUCE COLD ROLLING CYLINDERS BY DEPOSING A HIGH ALLOY STEEL LAYER ON A NORMAL STEEL CYLINDER [DEVELOPPEMENT D'UN NOUVEAU PROCEDE DE FABRICATION DE CYLINDRES DE LAMINOIRS A FROID PAR DEPOT D'ACIER A HAUTES CARACTERISTIQUES SUR UNE AME EN ACIER]
A. Boucher Feb. 1984 57 p refs In FRENCH Original contains color illustrations
(Rept-1645) Avail: NTIS HC A04/MF A01

High speed steel was sprayed by a plasma system on to normal steel cylinders. A double arc plasma system was adopted. The first arc ionizes the gas between the anode and a tungsten electrode, while the second is established between the anode and the cylinder. Cylinders of up to 315 mm diameter are manufactured. The results show a good surface quality and an improved life. The existence of microporosities remains a problem. Author (ESA)

N86-17587# Centre Technique des Industries Mecaniques, Senlis (France).
SLOW MOTOR: ISO ROUND ROBIN TESTS Final Report [MOTEUR LENT. ESSAIS CIRCULAIRES ISO]
J. P. Lecerf and P. Meurice Nov. 1984 57 p In FRENCH
(CETIM-N-01270) Avail: NTIS HC A04/MF A01

A test procedure for a hydraulic slow speed motor by the constant flow and torque method to be verified in Germany, France, Denmark, United States, and Japan aiming to stablish an ISO test norm is proposed. The measured parameters and the instrumentation characteristics are detailed. The experimental results show that velocity variations increase with load, and are larger at lower fluid flow for a constant torque. The variations in feed pressure are small under variations of the load torque. The conclusion is that the method could be considered a base to work set an ISO standard. Author (ESA)

N86-17588# National Aerospace Lab., Amsterdam (Netherlands).
[ACTIVITIES REPORT IN AEROSPACE RESEARCH, WITH DATA CONCERNING THE SCIENTIFIC COMMITTEE NLR-NIVR, INTERNATIONAL COOPERATION CONCERNING AGARD, DNW, GARTEUR AND COOPERATION WITH INDONESIA] Annual Report, 1984 [VERSLAG OVER HET JAAR 1984. MET GEGEVENS OMTRENT DE WETENSCHAPPELIJKE COMMISSIE NLR-NIVR, DE INTERNATIONALE SAMENWERKING IN AGARD-, DNW-, ETW- EN GARTEUR-VERBAND, EN OMTRENT DE SAMENWERKING MET INODNESIE]
1984 145 p refs Partly in DUTCH and ENGLISH Original contains color illustrations
Avail: NTIS HC A07/MF A01

Aerodynamics, flight, structures and materials, space technology and remote sensing, informatics, environment, energy supply, and equipment, were studied. Research for the Fokker-50 and 100 projects and related development of a measuring, recording, and data processing system for aircraft are described. Damage tolerance of aircraft structures and materials such as carbon/epoxy laminates with outer plies of glass, Aramid and carbon fabric, titanium alloys, and carbon fiber composites, were investigated. Fluid physics research, spacecraft attitude control system tests, and thermal vacuum research were carried out. The development of a multispectral CCD scanner, synthetic aperture radar, and side-looking airborne radar, were studied. A program to integrate aerospace informatics disciplines is described. Air traffic noise calculations, and windpower utilization research were executed. A simulation system for the satellite navigation system NAVSAT was developed. A low-speed wind tunnel LST 3x2.25 was commissioned. Author (ESA)

N86-17648# Joint Publications Research Service, Arlington, Va.
ESTABLISHMENT AND USE OF TIME UNIFICATION SYSTEM FOR CIVIL AVIATION
M. M. Malyy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 30 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 28-30 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17650# Joint Publications Research Service, Arlington, Va.
METHOD OF MEASURING EMITTANCE OF THERMAL INSULATION MATERIALS AT LOW TEMPERATURES
L. Ya. Paderin, I. M. Baskin, and Yu. V. Filin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 33 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 39-40 (For primary document see N86-17640 08-31)
Avail: NTIS HC A03/MF A01

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-17589 Polytechnic Inst. of New York, Brooklyn.
THE SCATTERING OF GAUSSIAN BEAMS INCIDENT ON A TRANSMITTING LAYER CONFIGURATION Ph.D. Thesis
1985 138 p
Avail: Univ. Microfilms Order No. DA8515844

The work presented here is a detailed investigation of the guidance and scattering of electromagnetic waves by lossless or lossy multilayered structures. Analytical results are obtained for the characteristic (surface and leaky) waves supported by a layer

placed between two different dielectric media, which thus form canonical asymmetrical duct, transition or gap configurations. It is found that such asymmetric structures may support four basic varieties of surface-wave fields and six varieties of leaky-wave fields. Four of the six leaky waves are novel and they account for leakage of energy into only one of the two media exterior to the central layer. These four varieties of novel leaky-wave fields cease to exist in the special case of symmetric structures, in which the two exterior media are identical. The behavior of the leaky waves in the duct geometry are somewhat different from those in the gap geometry, while the properties of the leaky-wave fields in the transition geometry may be either duct-like or gap-like depending on the physical parameters involved. Dissert. Abstr.

N86-17590 California Univ., San Diego.
CALCULATING RADAR DETECTION PROBABILITIES BY CONTOUR INTEGRATION Ph.D. Thesis
James Alexander Ritcey 1985 184 p
Avail: Univ. Microfilms Order No. DA8517914

Evaluating the performance of signal processing schemes often reduces to computing the error probability in a related hypothesis test. The main theme of this dissertation is to numerically evaluate radar signal processing schemes from contour integrals for error or tail probabilities. The tail probabilities are written as contour integrals that involve the moment generating function (m.g.f.) of the test statistic which obviates the evaluation of an indefinite integral of the density function. Since we are interested in decision thresholds far out on the tails of the distribution and test statistics which are the sum of a large number of processed pulse returns, an efficient numerical procedure is required. A numerical procedure is described that is based on the method of steepest descent and consists of numerical contour integration in the complex plane. After tracing the history of the algorithm, the numerical integration is described. The trapezoidal rule is employed and we obtain explicit bounds for the truncation error. A generic m.g.f. is used which is applicable in many detection problems. Some classical radar detectors are evaluated for both nonfluctuating and chi-squared fluctuating targets using saddlepoint integration. Dissert. Abstr.

N86-17591 Pennsylvania Transportation Inst., University Park.
BEAM STEERABLE MICROWAVE ANTENNA FOR AUTOMOTIVE RADAR APPLICATION Ph.D. Thesis
Vincent Paul McGinn 1985 215 p
Avail: Univ. Microfilms Order No. DA8516066

Research described herein reports on the techniques developed for documenting the performance of an experimental (baseline) forward looking collision avoidance automotive radar system. The system studied operates at a frequency of 36 Gigahertz and emits a beam stationary with respect to the vehicle. On-the-road testing has been accomplished and deficiencies are highlighted. Specifically, false alarms caused by highway guard rails and complex traffic situations are demonstrated in an 18-minute television production suitable for public broadcasting. The program utilizes panoramic views of actual driving situations accompanied by real time telemetry data representing vehicle dynamics and radar system response. Data gathered suggests performance enhancement (lower false alarm rate and improved resolution) through the use of a beam steerable antenna. Since the ultimate goal of perfecting an automotive collision avoidance radar system should be widespread consumer application, cost effectiveness is a necessity. To this end, a new microwave device and technique are suggested. Dissert. Abstr.

N86-17592 Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
THE PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB) TEST REGULATIONS. IMMUNITY FROM DISTURBANCE. METHODS TO TEST THE INFLUENCE OF ELECTROMAGNETIC DISTURBANCES ON MEASURING EQUIPMENT [PTB-PRUEFREGELN. STOERFESTIGKEIT. VERFAHREN ZUR PRUEFUNG DES EINFLUSSES EKELTROMAGNETISCHER STOERGROESSEN AUF MESSGERAETE]
Georg Bittner, Peter Thoma, and Wilhelm Eisfelder 1984 30 p refs In GERMAN
(ISSN-0341-7964) Copyright. Avail: Issuing Activity

The testing of the effects of external electromagnetic disturbances on measuring equipment is presented. The tests were conducted using electromagnetic disturbances as proposed in a guideline of the European Communities. The requirements for the test equipment, the test piece, the testing method and aids are discussed, including power supplies, battery supply, 50 Hz magnetic field, electrostatic discharges, and signal in and outputs. The test piece passes the test if, under the influence of external electromagnetic disturbances, the specified error bars are not exceeded or the error function is recognizable. The test results are listed. Author (ESA)

N86-17593 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
VISUALISATIONS OF SPEECH BASED ON A MODEL OF THE PERIPHERAL AUDITORY SYSTEM
D. Schofield Jul. 1985 33 p refs
(NPL-DITC-62/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Application of information available concerning the peripheral auditory system to automatic speech recognition, in particular to the initial processing of the acoustic signal was studied. Problems with conventional methods of signal analysis, and knowledge on the peripheral auditory system are reviewed. This knowledge is applied to modeling the system as far as the input to the nerve cells, using a filterbank approach. Visualizations of the results are included. It is concluded that the model could be used as the first stage of a two layer process, the second stage modeling effects within the nervous system. The visualizations also have promise as an alternative to spectral displays derived from digital block-mode processing. Author (ESA)

N86-17594*# California Univ., Los Angeles. Dept. of Electrical Engineering.
LOW COST VOICE COMPRESSION FOR MOBILE DIGITAL RADIOS Final Report
Jim K. Omura Jun. 1985 87 p
(Contract JPL-957030)
(NASA-CR-176490; NAS 1.26:176490) Avail: NTIS HC A05/MF A01 CSCL 17B

A new technique for low cost rubust voice compression at 4800 bits per second was studied. The approach was based on using a cascade of digital biquad adaptive filters with simplified multipulse excitation followed by simple bit sequence compression. G.L.C.

N86-17595*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TECHNOLOGY ACHIEVEMENTS AND PROJECTIONS FOR COMMUNICATION SATELLITES OF THE FUTURE
James W. Bagwell 1986 13 p refs Proposed for presentation at the 11th Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by AIAA
(NASA-TM-87201; E-2856; NAS 1.15:87201) Avail: NTIS HC A02/MF A01 CSCL 17B

Multibeam systems of the future using monolithic microwave integrated circuits to provide phase control and power gain are contrasted with discrete microwave power amplifiers from 10 to 75 W and their associated waveguide feeds, phase shifters and power splitters. Challenging new enabling technology areas include advanced electrooptical control and signal feeds. Large scale MMIC's will be used incorporating on chip control interfaces, latching, and phase and amplitude control with power levels of a few watts each. Beam forming algorithms for 80 to 90 deg. wide angle scanning and precise beam forming under wide ranging environments will be required. Satelllite systems using these dynamically reconfigured multibeam antenna systems will demand greater degrees of beam interconnectivity. Multiband and multiservice users will be interconnected through the same space platform. Monolithic switching arrays operating over a wide range of RF and IF frequencies are contrasted with current IF switch technology

implemented discretely. Size, weight, and performance improvements by an order of magnitude are projected. Author

N86-17596# Naval Postgraduate School, Monterey, Calif.
THE USE OF FILTERS IN DIGITAL COHERENT RECEIVERS OPERATING IN A JAMMING AND NOISE ENVIRONMENT M.S. Thesis
D. Macone Jun. 1985 133 p
(AD-A159792) Avail: NTIS HC A07/MF A01 CSCL 20/14

The effectiveness of the use of front-end bandstop filters in coherent digital receivers versus previously derived optimum jammer waveforms is analyzed. The receivers studied are the binary frequency shift key (FSK) and the binary phase shift key (PSK) coherent (correlator) receivers. The filters analyzed for use against an optimum jammer are a single bandstop region ideal filter, and a second order single bandstop region real filter. General expressions in frequency domain form, are derived for the probability of error of coherent receivers with a front-end filter, then applied specifically to the performance of receivers operating in the presence of noise, jamming, and PSK or FSK modulation. Finally these results are presented in graphical form and, additionally, analyzed and interpreted. Author (GRA)

N86-17597# Georgia Inst. of Tech., Atlanta.
A STUDY OF THE SPIRAPHASE AND ANISOTROPIC SUBSTRATES IN MICROSTRIP ANTENNAS Interim Report, Dec. 1983 - Dec. 1984
J. J. H. Wang Aug. 1985 46 p
(Contract F19628-84-K-0010)
(AD-A159862; RADC-TR-85-146) Avail: NTIS HC A03/MF A01 CSCL 09/5

Two subjects are discussed in this interim report; the spiraphase antenna and the use of anisotropic substrates in microstrip antennas to decouple the radiation and scattering modes. It was observed that the spiraphase, a multiarm spiral structure can be used either as a reflector or directly as a transmit and/or receive antenna. The bandwidth of the reflector case is much more limited; however, improvements are possible by understanding the mechanism that limits the bandwidth. The broadband nature of the spiraphase used directly as a transmit and/or receive antenna was established. The development of spiraphase into a microstrip antenna is discussed. The use of anisotropic substrates, or other substrates with exotic materials, was found to be useful in decoupling the radiation and scattering modes in the microstrip antenna. This decoupling process is made possible because the use of anisotropic material nullified the foundation on which the reciprocity, or the equivalence of receiving and transmitting patterns of antenna rests. Author (GRA)

N86-17598# Oklahoma State Univ., Stillwater. School of Electrical and Computer Engineering.
AN ADAPTIVE APPROACH TO A 2.4 KB/S LPC SPEECH CODING SYSTEM Final Report
R. Yarlagadda, D. L. Soldan, R. D. Preuss, and L. D. 05Sims Hoy, C. S. Jul. 1985 255 p
(Contract F19628-81-K-0043)
(AD-A160312; RADC-TR-85-45) Avail: NTIS HC A12/MF A01 CSCL 17/2

The goal of this research was to investigate (1) Adaptive estimation methods for noise suppression and performance enhancement of Narrowband Coding Systems for speech signals and (2) Autoregressive spectral estimation in noisy signals for speech analysis applications. Various prefiltering techniques for improving linear predictive coding systems were investigated. Filter coefficients were varied to optimize each filter technique to remove noise from the speech signal. A new prefilter consisting of an adaptive digital predictor (ADP) with pitch period delay was developed and evaluated. The one-dimension filter approach was expanded upon to use a two-dimensional approach to suppress noise in the short time fourier transform domain. The two dimensional approach was found to have significant potential. Fast algorithms for efficient solution of the linear estimation problem and a new recursive linear estimator suitable for rapid estimation of a signal in noise were developed. GRA

N86-17599# Georgia Inst. of Tech., Atlanta. School of Electrical Engineering.
CALCULATIONS OF TRANSIENT FIELDS IN THE FELIX EXPERIMENTS AT ARGONNE USING NULL FIELD INTEGRATED TECHNIQUES
H. C. Han, K. R. Davey, and L. Turner Aug. 1985 30 p Prepared in cooperation with Argonne National Lab., Ill.
(Contract DE-AS05-78ET-52025)
(DE85-017617; GTFR-60) Avail: NTIS HC A03/MF A01

The transient eddy current problem is characteristically computationally intensive. The motivation for this research was to realize an efficient, accurate, solution technique involving small matrices via an eigenvalue approach. Such a technique is indeed realized and tested using the null field integral technique. Using smart (i.e., efficient, global) basis functions to represent unknowns in terms of a minimum number of unknowns, homogeneous eigenvectors and eigenvalues are first determined. The general excitatory response is then represented in terms of these eigenvalues/eigenvectors. Excellent results are obtained for the Argonne Felix cylinder experiments using a 4 x 4 matrix. Extension to the 3-D problem (short cylinder) is set up in terms of an 8 x 8 matrix. DOE

N86-17600# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
CONTRIBUTIONS TO COMBINATION CODING: SUM ORDERING AND COVERING RADIUS Ph.D. Thesis [CONTRIBUTIONS AU CODAGE COMBINATOIRE: ORDRES ADDITIFS, RAYON DE RECOUVREMENT]
Antoine Lobstein Mar. 1985 156 p refs In FRENCH
(ENST-85E002; ISSN-0751-1353) Avail: NTIS HC A08/MF A01

Total order additive relationships are studied and related to knapsack coding methods. The generation of all sum ordering relations compatible with the same size total natural order relation is described. The minimum number of words for a code designed as K(n,t), with a length n and covering ratio t, is determined for linear and nonlinear codes. Bounds and error correcting codes are discussed Author (ESA)

N86-17601# Ferranti Ltd., Bracknell (England). System Problem Analysis Group.
ANALOGUE SAR SIGNAL PROCESSING: ARCHITECTURE AND TECHNOLOGY
D. J. Bonfield, K. M. Harvey, J. R. E. Thomas, and D. W. Cruse Paris ESA Mar. 1979 132 p refs
(Contract ESA-3400/79/NL-HP(SC))
(Rept-3881-Issue-1-Vol-2; ESA-CR(P)-1512) Avail: NTIS HC A07/MF A01

Analog implementation of SAR processing junctions, including sampling and time expansion, range correlation; prefiltering, including range migration correction; and azimuth correlation was studied. Prefiltering and azimuth correlation functions were breadboarded. For each processing function, alternative implementations are considered. Power consumption based on charge transfer device (CTD) technology was estimated. For the prefilter and azimuth correlator, promising architectures were explored in terms of the CTD and SAW devices available, to select practical solutions for breadboarding. Details of candidate devices are provided and each breadboard is described. For the prefitter breadboard an RSRE CCD Video Integrator was selected. For the azimuth correlator a Reticon type R5401 binary analog correlator was chosen. Author (ESA)

N86-17602# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
A MODEL FOR THE ANALYSIS OF ORTHOGONAL MODULATION METHODS FOR DIGITAL TRANSMISSION
Friedrich Roeder Jan. 1985 50 p refs In GERMAN; ENGLISH summary
(FI-445-TBr-23) Avail: NTIS HC A03/MF A01

A baseband model for simulation of orthogonal modulation systems and the explicit calculation of important parameters was derived. The model is explained using a digital radio relay transmission, but it is also applicable to data transmission on symmetrical lines using quadrature-amplitude-modulation methods as well as phase-shift-keying transmission in satellite communications. The signal to noise ratio loss for carrier phase deviation at the receiver end is exactly given for all essential transmission methods employing orthogonal modulation. The temporal eye opening and the jitter sensitivity of the systems are calculated. The transfer functions causing crosstalk in multipath propagation, vestigial and single-sideband transmission are derived. An equalizer circuit for compensation of the signal to noise ratio loss due to a carrier phase error on the receive side is presented and implemented. Author (ESA)

N86-17603# Fondazione Ugo Bordoni, Rome (Italy).
[REPORT ON THE JOINT ACTIVITIES OF THE UGO BORDONI FOUNDATION AND THE ISTITUTO SUPERIORE DELLE POSTE E DELLE TELECOMUNICAZIONI] Annual Report, 1984 [RELAZIONE SULL'ATTIVITA DI COLLABORAZIONE CON L'I.S.P.T. SVOLTA DALLA FONDAZIONE UGO BORDONI NEL 1984]
Feb. 1985 91 p refs In ITALIAN
Avail: NTIS HC A05/MF A01

Research in radiocommunication systems, cable communications systems and numerical systems is presented. Also, research on automatic communication systems for management and control, and laser and optoelectronic systems is summarized. Author (ESA)

N86-17604# Research Inst. of National Defence, Linkoeping (Sweden).
FREQUENCY HOPPING RADIO FOR HIGH FREQUENCIES: AN EXPERIMENTAL SYSTEM
Bjoern Johansson, Arne Lindblad, and Goesta Carlsson Apr. 1985 38 p refs In SWEDISH; ENGLISH summary
(FOA-C-30390-E2; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

Investigations to find a research facility for studying the fine structure of the ionosphere, and for studying the principles of noiseless high frequency systems are summarized. An experimental HF hopping system for data transmission is described; the hop-rate is 100 hop/sec. The modules of the system, frequency hop routine, data program, software of the microprocessor, derivation of the program synchronization, detector, and demodulator units are reviewed. The system was submitted to a limited testing of the different functions, over an open antenna; no effective test run is reported. Author (ESA)

N86-17605# Research Inst. of National Defence, Linkoeping (Sweden).
ELECTROMAGNETIC PULSE (EMP): EXPOSURE OF MISSILE 56 IN EMP SIMULATOR SAPIENS
Torsten Dikvall Jun. 1985 35 p refs In SWEDISH; ENGLISH summary
(FOA-C-30398-A3; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

The effects on the electric field caused by the object (missile) in the SAPIENS electromagnetic pulse simulator were studied. A noticeable effect on the field strength is noted close to the object, due to the characteristics of the field. This effect also appears in real electromagnetic pulse environments. During these tests 200 pulses were distributed with good accuracy of reproduction. The SAPIENS is an outdoor device and tests carried out in winter show that weather has very little influence on results.
Author (ESA)

N86-17606# Research Inst. of National Defence, Linkoeping (Sweden).
SAPIENS MEMO 9: THE DEPENDANCE OF THE ELECTRIC FIELD ON THE INDUCTANCE OF THE TERMINATION
Sven Garmland Jun. 1985 25 p refs In SWEDISH; ENGLISH summary
(FOA-C-30399-A3; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

Measurements of the electric field in the EMP simulator revealed deviations from an ideal curve shape, the largest deviation coming from the termination of the simulator antenna. High frequency components radiate through the termination, and low frequency ones are terminated by a resistive load. The space in between, where the wavelength is equal to the dimension of the termination, presents difficulties; the inductance of the termination is crucial. By increasing the area of the lines connecting the resistors of the termination, the inductance can be reduced. It is shown how reflections from the termination can be diminished from 10% to 2% by replacing the lines with cylinders made of chicken-wire. Author (ESA)

N86-17607# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. HF-Verfahren.
A SYNTHETIC APERTURE RADAR SYSTEM SIMULATION MODEL: SARSIM
Timothy K. Pike Jul. 1985 51 p refs
(DFVLR-Mitt-85-11; ISSN-0176-7739) Avail: NTIS HC A04/MF A01; DFVLR, Cologne, West Germany DM 17

The SARSIM pulse-by-pulse radar simulator, producing as output the SAR image of the input target is described. For each physical element of the system, there is a corresponding software module. The software modules simulate the physical element characteristics except the linear gain of the element. This means that the overall model should be seen as a relative, rather than absolute, assessment tool. Simulation of a satellite SAR system is shown. Author (ESA)

N86-17608# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
THE POWER SPECTRAL DENSITY OF THE HDB2 AND THE HDB3 CODED SIGNALS
Guenter Morgenstern Dec. 1984 104 p refs In GERMAN; ENGLISH summary
(FI-44-TBr-96) Avail: NTIS HC A06/MF A01

Explicit mathematical relations for the power density spectra of HDB2 and HDB3-encoded signals were derived. The derivation started from the coding laws in the case of arbitrary and rectangular pulse shapes. The coding law was regarded as a block code including blocks of different lengths, the code table containing four alphabets. The similarity of the coding laws of HDB2 and HDB3-codes is reflected in the derivation of the spectral properties. The results are graphically represented. The representation is detailed enough to be also applicable to other zero-sequence substitution codes like CHBn. Author (ESA)

N86-17609# Wageningen Agricultural Univ. (Netherlands). Soil Survey Inst.
THE 1984 L-BAND RADAR EXPERIMENT. PART 1: GROUND TRUTH FLEVO (NETHERLANDS) 1984 M.S. Thesis
L. Stroosnijder, J. Stolp, and G. G. Lemoine 1984 86 p refs Original contains color illustrations
Avail: NTIS HC A05/MF A01

Ground truth of a polder area (7000 ha) was established for the SIR-B radar (which failed due to technical problems). A 10 km long light track of an airborne L-band scatterometer located diagonally over the test area is analyzed, resulting in soil moisture, surface roughness, and vegetation data. Data for 15 fields are determined as field averages of areas of 25 ha and may be considered representative for the 75 ha large fields. Analysis of the spatial dependency of soil moisture content, and the statistical accuracy of its determination, shows that 9 samples, distributed in a regular grid, produce a sufficiently accurate mean value over the 25 ha on each field. Author (ESA)

N86-17610# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.

SPEECH PROCESSING FOR INTELLIGIBILITY IMPROVEMENT
G. Langhout Jul. 1985 58 p refs In DUTCH; ENGLISH summary
(IZF-1985-14; TDCK-93326) Avail: NTIS HC A04/MF A01

Literature on speech processing to enhance intelligibility in poor listening conditions was reviewed. As the perception of consonants is essential for intelligibility, relevant acoustic features were surveyed. Data from consonant spectra measurements and from listening experiments in which certain features of the consonants were varied were collected. The effects of disturbances, such as background noise and resonances, on intelligibility were investigated. Processing methods carried out on speech to improve its quality are summarized. Author (ESA)

N86-17611# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
[ACTIVITIES REPORT OF THE DEPARTMENT OF SYSTEMS AND COMMUNICATIONS, CNRS-UA 820] Scientific Report, 1984 [RAPPORT SCIENTIFIQUE, 1984]
Jun. 1985 113 p refs In FRENCH
(ENST-85D002; ISSN-0751-1345) Avail: NTIS HC A06/MF A01

Stochastic systems; digital systems; modeling techniques; numerical communication theory; pattern recognition and voice recognition; and signal processing architectures are studied. Author (ESA)

N86-17612# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
AREA COVERAGE OF RADIO NETWORKS: METHOD DESCRIPTION AND PROPAGATION MEASUREMENTS IN URBAN AREA
Stellan Nilsson Aug. 1985 29 p refs In SWEDISH; ENGLISH summary
(FOA-C-30397-E2; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

A method for measuring and characterizing the signal strength, in terms of coverage area, from a radio transmitter is described, and propagation results in the city, and surrounding countryside of a typical urban environment are reported. The measurements were performed at a frequency of 400 MHz. Computerized simulation and theoretical models (an attenuation model where the ground is supposed to be an undisturbed spherical surface, and a semiempirical model which proves to be the best fit for this study) are described. Author (ESA)

N86-17613# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
A PULSED 8 W FET POWER AMPLIFIER AT 9.4 GHz
Staffan Rudner and Carl-Gustaf Svensson Aug. 1985 32 p refs (FOA-C-30402-E; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

A pulsed transistor power amplifier to be used as a transmitter final stage in a close range radar system was developed. In the band 9.2 to 9.6 GHz the maximum output power varies between 7.0 and 8.1 W and the 1 dB compressed gain is between 12.6 and 16.3 dB. The amplifier operates with a pulsed drain voltage to minimize heat dissipation. For pulses shorter than 2 microsec and duty cycles below 10 %, no heating effects are seen. Pulse rise and fall time is 0.12 microsec. Author (ESA)

N86-17467# Alcatel Thomson Espace, Toulouse (France).
INFLUENCE OF THE BUS REGULATION ON TELECOMMUNICATION SPACECRAFT POWER SYSTEM AND DISTRIBUTION
A. Capel and D. Sullivan (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 307-318 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17641# Joint Publications Research Service, Arlington, Va.
RESEARCH ON PROPAGATION OF DECIMETRIC RADIOWAVES AT HIGH LATITUDES
V. N. Trottskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 1 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 39-41 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17642# Joint Publications Research Service, Arlington, Va.
ONE-CHANNEL ADAPTIVE ANTENNA FOR TROPOSHERE MICROWAVE RELAY LINES
O. P. Frolov and V. M. Tsirlin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1985 p 2 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 28-31 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-17614 California Univ., San Diego.
INTEGRATED OPTOELECTRONIC CIRCUITS AND THEIR MODULAR DESIGNS FOR RESIDUE NUMBER COMPUTATION Ph.D. Thesis
Sun-Yuan Huang 1985 141 p
Avail: Univ. Microfilms Order No. DA8515593

Integrated optoelectronic circuits (IOEC) have been fabricated in hybrid LiNbO3/Si substrates. Optical signals were carried in and out of the IOEC chip through optical fiber arrays. Interactions among guided light signals in the optical channels were achieved by blazed grating couplers and mode cutoff electrooptic modulators in LiNbO3, as well as etched mesa lateral phototransistors in Si. The rating couplers tapped the light signals from the optical channel waveguide, and the photodetectors converted the intercepted light signals into electrical currents. With a specially designed electrical routing or after the electronic signal processing in Si, the resulting current then changed the voltage applied to the electrooptic modulator via resistive contacts between the two substrates, thereby controlling the light output of the IOEC. Etched mesa Si lateral phototransistors (EMS-LPT) were designed for collecting and efficiently converting to photocurrent the optical energy deflected from the blazed grating couplers. By forming a localized photoactive region in the mesa, a high photogain of 110 was measured in the uniform base EMS-LPT and of 68 in the double diffused EMS-LPT. Dissert. Abstr.

N86-17615 Wyoming Univ., Laramie.
CLASS E FREQUENCY MULTIPLIERS Ph.D. Thesis
Robert E. Zulinski 1985 198 p
Avail: Univ. Microfilms Order No. DA8517873

The theoretical operation of class E frequency multipliers has been described without experimental verification by Kozyrev. To provide experimental verification, three class E frequency multipliers were designed according to the Kozyrev theory, and measured and theoretical performances were compared. In each case agreement is poor, showing errors over thirty percent, indicating the need for further research. New and complete analyses are performed on two class E circuits: that with a radio frequency (RF) choke in the d.c. supply lead, and that with an arbitrary but smaller reactance replacing the RF choke. For both cases the optimum operating point (100% efficiency at maximum power output capability) is determined for operation at any harmonic, including the first, and equations which yield the requisite component values and resulting operating parameters are given. These equations provide an easily used repeatable design method for constructing class E frequency multipliers. The theoretical design

methods exhibit excellent agreement with observed operation, with errors in the range of four to twelve percent. Dissert. Abstr.

N86-17616 Royal Aircraft Establishment, Farnborough (England).
AN EXPERIMENTAL VERIFICATION OF PREDICTED CURRENT AND VOLTAGE WAVEFORMS IN A THREE-PHASE FULL-WAVE RECTIFIED BRIDGE CIRCUIT WITH SOURCE RESISTANCE AND INDUCTANCE WHEN DRIVING A PURELY RESISTIVE LOAD
J. W. R. Cox and T. J. Riglar Nov. 1983 91 p refs
(RAE-TR-83084; RAE-RAD-NAV-129; BR95243) Copyright. Avail: Issuing Activity

Experimental verification of calculations which predict the current and voltage waveforms in a three-phase full-wave rectified bridge circuit is presented. The three-phase source is balanced, and the output impedance of each phase comprises a resistance in series with an inductance. The source voltages vary sinusoidally with time. The calculations are exact save for the approximation that the potential drop across the diodes is constant when they are conducting. Author (ESA)

N86-17617# Royal Signals and Radar Establishment, Malvern (England).
MICROWAVE SENSOR DESIGN USING CAD TECHNIQUES
D. Greenhalgh and S. J. Kidd Jun. 1985 30 p refs
(AD-A159518; RSRE-MEMO-3742; BR96714) Avail: NTIS HC A03/MF A01 CSCL 09/3

A computer aided design facility that enables microwave sensors to be designed and optimized is described. The facility consists of a suite of computer program modules, each of which emulates a typical radar subsystem and which may be linked with other modules to emulate a complete system. The sensor environment part of the facility includes target and clutter models. The sensor hardware part of the facility includes nonlinear effects, and the ability to interchange recorded and simulated signals. Author (ESA)

N86-17618# Royal Signals and Radar Establishment, Malvern (England).
MODELLING TRANSMISSION GATES IN ELLA
K. R. Milner and T. L. Thorp May 1985 21 p
(AD-A159557; RSRE-MEMO-3825; BR96524) Avail: NTIS HC A02/MF A01 CSCL 09/3

An algorithm for modeling transmission gates and its implementation in the hardware design and description language ELLA are discussed. Bidirectional and unidirectional models are considered. Author (ESA)

N86-17619# Naval Postgraduate School, Monterey, Calif.
COMPOSITE OPERATIONAL AMPLIFIERS AND THEIR USE IN IMPROVING BANDWIDTH, SPEED AND ACCURACY IN ACTIVE NETWORKS M.S. Thesis
M. A. Luczak Jun. 1985 178 p
(AD-A159819) Avail: NTIS HC A09/MF A01 CSCL 09/5

This research examines a unified approach to several of the problems associated with Operational Amplifiers (OAs), namely, speed, accuracy, and frequency dependent gain. The approach which is examined is the Composite Operational Amplifier(CNOA), where N=2, 3, or 4 single OAs. The CNOA is found to greatly extend the useful operating frequencies of the OA while maintaining low sensitivity to circuit element variations and a high degree of stability. It also provides a method for obtaining a fast and accurate OA. An additional feature of the CNOA is that can be implemented using current technology. A computer model for the single OA was created and validated, and provided the basis for proving the superiority of the CNOA. Theoretical and experimental results were used with these computer simulation results to fully substantiate the findings. (Theses) Author (GRA)

N86-17620# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
A DEVICE FOR COMPUTER-CONTROLLED POTENTIAL MODULATION IN ELECTROCHEMICAL FOURIER TRANSFORM INFRARED SPECTROSCOPY
D. S. Corrigan, D. Milner, and M. J. Weaver Aug. 1985 9 p
(Contract N00014-79-C-0670)
(AD-A159826; TR-47) Avail: NTIS HC A02/MF A01 CSCL 07/4

A circuit has been designed for the automatic control of potential modulation for subtractively normalized interfacial Fourier transform infrared spectroscopy (SNIFTIRS) using an IBM IR/90 series FTIR spectrometer. This device enables the potential modulation to remain synchronized with the spectral data collection under all conditions. Author (GRA)

N86-17621# Naval Postgraduate School, Monterey, Calif.
A CSMP COMMUTATION MODEL FOR DESIGN STUDY OF A BRUSHLESS dc MOTOR POWER CONDITIONER FOR A CRUISE MISSILE FIN CONTROL ACTUATOR M.S. Thesis
P. N. MacMillan Jun. 1985 106 p
(AD-A159855) Avail: NTIS HC A06/MF A01 CSCL 10/2

Recent improvements in rare earth magnets have made it possible to construct strong, lightweight, high horsepower dc motors. This has occasioned a reassessment of electromechanical actuators as alternatives to comparable pneumatic and hydraulic systems for use as flight control actuators for tactical missiles. A dynamic equivalent circuit model for the analysis of a small four pole brushless dc motor fed by a transistorized power conditioner utilizing high speed switching power transistors as final elements is presented. The influence of electronic commutation on instantaneous dynamic motor performance is particularly demonstrated and good correlation between computer simulation and typical experimentally obtained performance data is achieved. The model is implemented in CSMP language and features more accurate air gap flux representation over previous work. Hall effect sensor rotor position feedback is simulated. Both constant and variable air gap flux is modeled and the variable flux model treats the flux as a fundamental and one harmonic. Author (GRA)

N86-17622# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
IMPREGNANT COMPOSITION IN DISPENSER CATHODES
H. K. A. Kan and R. R. Seaver 12 Aug. 1985 22 p
(Contract F04701-83-C-0084)
(AD-A160044; TR-0084A(5945-02)-3; SD-TR-85-50) Avail: NTIS HC A02/MF A01 CSCL 09/1

The compositions of impregnants inside B-type dispenser cathodes containing barium calcium aluminates were examined by means of quantitative microprobe analysis. The impregnant inside the porous tungsten structure was supported with plastic in order to prevent damage when the cathode was sectioned. The impregnant compositions were found to be consistently deficient in CaO when compared to the nominal composition. Variations and reproducibility in composition are discussed. GRA

N86-17623# Argonne National Lab., Ill.
DETAILED DESIGN OF A 13 kA 13 kV dc SOLID-STATE TURN-OFF-SWITCH
W. F. Praeg 1985 7 p Presented at the IEEE-Industry Applications Society Annual Meeting, Toronto, Ontario, 6 Oct. 1985
(Contract W-31-109-eng-38)
(DE85-013874; CONF-851071-1) Avail: NTIS HC A02/MF A01

An experimental facility for the study of electromagnetic effects in the First Wall-Blanket-shield (FWBS) systems of fusion reactors has been constructed at Argonne National Laboratory (ANL). In a test volume of 0.76 cu m, a vertical, pulsed 5 kG dipole field (B < 320 kGs(-1)) is perpendicular to a 10 kG solenoid field. Power supplies of 2.75 MW at 550 V dc and 5.5 MW at 550 V dc and a solid-state switch rated at 13 kA and 13 kV (169 MW) control the pulsed magnetic fields. The total stored energy in the coils is 2.6 MJ. This paper describes the design and construction features of the solid-state switching circuit which turns off a dc of 13 kA in approximately 82 micros and holds off voltages of < 13 kV. DOE

N86-17624# Brigham Young Univ., Provo, Utah.
PHYSICAL AND CHEMICAL CHARACTERIZATION OF MULTI-

LAYERED STRUCTURES
J. M. Thorne, L. V. Knight, and B. G. Peterson 1985 8 p refs Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AS08-84DP-40199)
(DE85-016922; CONF-850887-19) Avail: NTIS HC A02/MF A01

It is important to know the physical and chemical properties of a multilayer if its performance is to be compared to theoretical predictions, or if guidance is needed for the production of superior multilayers. Accurate, nondestructive analytical methods, such as neutron activation analysis, are restricted to certain elements. Certain destructive methods, such as total carbon analysis by combustion, can be sensitive enough for use with very small samples. The method of choice depends upon sensitivity and specificity, both of which are discussed in this paper. DOE

N86-17625# Department of Energy, Washington, D. C.
SEMICONDUCTOR ELECTRODE WITH IMPROVED PHOTOSTABILITY CHARACTERISTICS Patent Application
A. J. Frank, inventor (to DOE) Filed 19 Feb. 1985 42 p Prepared in cooperation with Midwest Research Inst.
(Contract DE-AC02-83CH-10093)
(DE85-017805; US-Patent-Appl-SN-702715) Avail: NTIS HC A03/MF A01

An electrode is described for use in photoelectrochemical cells having an electrolyte which includes an aqueous constituent. The electrode consists of a semiconductor and a hydrophobic film disposed between the semiconductor and the aqueous constituent. The hydrophobic film is adapted to permit charges to pass therethrough while substantially decreasing the activity of the aqueous constituent at the semiconductor surface thereby decreasing the photodegradation of the semiconductor electrode. DOE

N86-17626# Oak Ridge National Lab., Tenn.
HIGH-FIELD ZnO VARISTORS: MICROSTRUCTURES AND PROPERTIES
R. J. Lauf, R. K. Williams, and F. T. Greenwald Jun. 1985 56 p
(Contract DE-AC05-84OR-21400)
(DE85-018136; ORNL-TM-9378) Avail: NTIS HC A04/MF A01

Zinc oxide varistors capable of supporting a high electric field before breakdown have been developed by use of sol-gel processing. Fine powders produced by the sol-gel technique can be fabricated into varistors by either hot pressing or pressureless sintering. Several model compositions were studied, including ZnO plus three additives and ZnO plus five additives. Sol-gel-derived materials were compared with conventional materials of the same nominal composition, and sintering was compared with hot pressing. Microstructural analysis and electrical measurements suggest that the benefits derived from sol-gel processing are related to the fine, uniform ZnO grain size and possibly to a more nearly optimum distribution of additives. DOE

N86-17627# Brookhaven National Lab., Upton, N. Y.
UHV PIEZOELECTRIC TRANSLATOR
T. Oversluizen and G. Watson 1985 10 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE85-018201; BNL-36904; CONF-850734-1) Avail: NTIS HC A02/MF A01

A UHV compatible piezoelectric translator has been developed to correct for angular misalignments in the crystals of a UHV X-ray monochromator. The unit is small, bakeable to 150C, and uses only ceramic materials for insulation. We report on the construction details, vacuum compatibility, mechanical properties, and uses of the device. DOE

N86-17628# Arkansas Univ., Little Rock. Dept. of Electronics and Instrumentation.
EFFECT OF CHARGE AND AERODYNAMIC PROPERTIES OF PARTICLES ON ELECTRIFIED FABRIC FILTRATION
G. S. Ballard, D. K. Hutchins, R. E. Ware, D. Cramer, G. Grayson, T. Foti, D. Wankum, I. Coffman, and M. K. Mazumder Sep. 1985 24 p
(Contract W-7405-eng-48)
(DE86-000013; UCRL-15622) Avail: NTIS HC A02/MF A01

An electrical-single particle aerodynamic relaxation time (E-SPART) analyzer employs a laser Doppler velocimeter for measuring motion of charged particles in an applied oscillatory electric field in order to simultaneously measure the aerodynamic diameter and electrostatic charge on a single particle. A modification has been made to incorporate both acoustic excitation and a dc electric field for simultaneous measurement of the aerodynamic diameter and electrical charge of particles so that measurement of particle size is possible even for uncharged particles. Other modifications include use of a frequency counting technique for measuring the drift velocity of the particle, thereby determining the particle charge, use of a Millikan apparatus only for calibrating electrical charge above $q = 4$, and optimization of the operation of the aerosol generator and an electrostatic charger for calibration. The analyzer optics are being modified for determining particle size down to 0.1 microns in diameter. Experimental data on particle size and charge measurement obtained after stabilizing the operating temperature of the phase locked loop demodulator are presented. DOE

N86-17629# Eagle-Picher Industries, Inc., Joplin, Mo.
RESEARCH, DEVELOPMENT, AND DEMONSTRATION OF NICKEL-IRON BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report, 1984
C. M. Lamb and E. P. Broglio Aug. 1985 40 p
(Contract W-31-109-eng-38)
(DE86-000520; ANL/OEPM-85-3) Avail: NTIS HC A03/MF A01

Progress and development of research on nickel-iron batteries used for electric vehicle propulsion are presented. The nickel plaque development effort continued toward achieving the thickness required to meet the program goals. New modules designed for high peak specific power were evaluated. Plate impregnation has been reduced to almost routine. The delivery of 1600 psi strength plaque from 3.0 to 4.0 mm in thickness is the single most important factor in the demonstration of 65 WH/Kg designs. Various additives to the electrolyte were evaluated. DOE

N86-17630# Department of Energy, Washington, D. C.
METHOD FOR SENSING AND MEASURING A CONCENTRATION OR PARTIAL PRESSURE OF A REACTANT USED IN A REDOX REACTION Patent Application
E. Findl, inventor (to DOE) (Brookhaven National Lab., Upton, N.Y.) Filed 21 Dec. 1984 28 p
(Contract DE-AC02-76CH-00016)
(DE85-017740; US-Patent-Appl-SN-685096) Avail: NTIS HC A03/MF A01

A method for sensing or measuring the partial pressure or concentration of an electroactive species used in conjunction with an electrolyte, the method being characterized by providing a constant current between an anode and a cathode of an electrolyte-containing cell, while measuring changes in voltage that occur between either the anode and cathode or between a reference electrode and one of the main electrodes of the cell, thereby to determine the concentration or partial pressure of the electro-active species as a function of said measured voltage changes. The method of the invention can be practiced using either a cell having only an anode and a cathode, or using a cell having an anode and a cathode in combination with a reference electrode. Accurate measurements of small concentrations or partial pressures of electro-active species are obtainable with the method of the invention, by using constant currents of only a few microamperes between the anode and cathode of the cell, while the concentration-determining voltage is measured. DOE

N86-17631# Research Inst. of National Defence, Linkoeping (Sweden).
MICROELECTRONIC IMAGE SENSORS: A REPORT FROM THE CHARGE TRANSFER DEVICE (CTD) TEAM AT FOA 3 Status

Report
Olof Engstroem, Sven-Tuve Persson, Haakan Pettersson, and Karl-Henrik Ryden May 1985 86 p refs
(FOA-C-30391-E1,E3; ISSN-0347-3708) Avail: NTIS HC A05/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

Three concepts of microelectronic image sensors where the photo effects are based on the properties of interfaces between silicon and metal silicides or insulators were investigated. An infrared sensitive image sensor for the 3 to 5 micron wavelength range was prepared. The photosensitive elements, patterned as a 4 x 4 matrix, consist of palladium silicide Schottky-diodes. Addressing of the different picture elements is made from shift registers placed on the same silicon chip. A concept for the storage of optical information was created. The basic principle relies on the possibilities to store electrons in deep lying energy levels in an insulator layer grown on silicon. A metal-insulator-semiconductor device, where the possibility of interaction between two images at the insulator-semiconductor interface is utilized for image recognition, was derived. Author (ESA)

N86-17632# Thorn EMI, Hayes (England).
A HIGH POWER, PULSED MICROWAVE TUBE FOR A SYNTHETIC APERTURE RADAR ELECTRICAL MODEL. PHASE 2: MANUFACTURE AND TEST Final Report
S. Gabrielson, T. M. Gardiner, P. C. Lane, V. J. Matthews, D. Perring, G. Phillips, J. Saunders, and R. A. Tuck Paris ESA Sep. 1984 206 p refs
(Contract ESA-5070/82/NL-PD(SC))
(EVT-852; ESA-CR(P)-2059) Avail: NTIS HC A06/MF A01

Manufacture, evaluation, and improvement of a klystron electrical model for synthetic aperture radar are summarized. An electrically and mechanically satisfactory gridded cathode design, with 1A/sqcm current loading was produced. Permanent magnet (PM) and periodic permanent magnet (PPM) systems to focus the electron beam in the klystron are demonstrated. Unmodulated beam transmission with a PM is 99% when the tube is fitted with a coaxial output and 94% with a waveguide output; 99.5% transmission is obtained with a PPM system. A low height waveguide output line is shown to be adequate to handle the output power. Despite modifications to the collector end of the permanent magnet, which result in a nonoptimum focusing field and worse beam transmission, the efficiency of the tube is > or = 40%. Up to 1.5 kV depression on a single collector is demonstrated. Conversion efficiency can be improved by redesigning the magnet cap. Author (ESA)

N86-17633# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
IMPROVED SEPARATORS FOR SILVER-HYDROGEN CELLS
T. L. Markin and R. J. Bones Paris ESA Dec. 1984 243 p refs
(Contract ESA-5478/83/NL-BI(SC))
(AERE-R-11513; ESA-CR(P)-2082) Avail: NTIS HC A11/MF A01

The polyamide/cellophane composite separator employed in Ag/H2 cells was replaced by zirconia cloth separators coated with zirconia sol on the side facing the Ag electrode and impregnated with polyphenylene oxide (PPO). Cells containing standard and zirconia separator were given 750 charge/discharge cycles employing LEO cycling conditions at 20 then 30 C. At 30 C, the cell containing the zirconia cloth separator short circuits at cycle 680; the base line cell reaches 750 without a short circuit, although Ag concentration in the cellophane layers increases. The main problem with coated zirconia cloth is to ensure that the coating is pinhole free. The few areas where Ag diffuses through the cloth probably corresponded to pinholes or channels in the coating. This problem may be very difficult to overcome. Author (ESA)

N86-17634# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
THE ESA PREFERRED PARTS LIST
Jun. 1985 82 p
(ESA-PSS-01-603; ISSN-0379-4059) Avail: NTIS HC A05/MF A01

Preferred electronic components to be used in the selection, procurement, and application of components for ESA spacecraft and associated equipment are listed. Some parts listed are capacitors, electric connectors, crystal diodes, inductors and resistors. Author (ESA)

N86-17635# Fraunhofer-Inst. fuer Festkoerpertechnologie, Munich (West Germany).
ANALYSIS OF DIELECTRIC LAYERS FOR VERY LARGE SCALE INTEGRATION (VLSI) APPLICATIONS, ESPECIALLY THE INFLUENCE OF STOICHIOMETRY AND HYDROGEN CONTENT ON THE PROPERTIES OF PLASMA NITRIDE LAYERS Final Report, Sep. 1981
Peter Eichinger and Peter Paduschek Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985 101 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-059; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21.50

Analytical techniques using MeV light-ion scattering were applied for the determination of the atomic composition of dielectric layers. Quantitative depth profiling of hydrogen was performed by the proton-proton forward scattering technique. The influence of deposition and annealing parameters on the composition of plasma-enhanced chemical vapor deposition silicon nitride layers and amorphous silicon layers was determined. It is shown that the mechanical stress of the layers is correlated with the bonding of hydrogen. Author (ESA)

N86-17636# Kema (N. V.), Arnhem (Netherlands). Dept. of Electrical Research.
HIGH-VOLTAGE MEASUREMENTS USING DIGITAL TECHNIQUES
H. G. Tempelaar, C. G. A. Koreman, and A. J. vanLoon, ed. 1984 11 p refs
(S/T-Rept-Vol-2-No-8; B8562576; ISBN-90-353-0019-X; ISSN-0167-8590) Avail: NTIS HC A02/MF A01

A transportable data-acquisition system for the determination of transient phenomena during switching operations in high-voltage networks was developed. From voltage dividers with an insulation level appropriate for 420 kV networks, the signals are sent through light guides (amplitude modulated) to analog/digital converters. Current-measuring devices based on Rogowski coils are used with a frequency-modulated optical system, with the possibility to transfer data from high potential to ground level. To avoid disturbances due to high electromagnetic fields, the recording apparatus is placed in a Faraday cage. High-frequency rejection filters and an insulating transformer are inserted in the power line. A PDP 11/34 microcomputer is used for programming, processing and storage of data on disk drives. Results from measurements carried out in the high-voltage laboratory as well as during switching operations of unloaded lines, transformers and motors in the field are given. Author (ESA)

N86-17637# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de la Physique Generale.
FEASIBILITY STUDY OF A DEVICE TO CONTROL AIRCRAFT ELECTROMAGNETIC PROTECTION [ETUDE DE FAISABILITE D'UN DISPOSITIF DE CONTROLE DES PROTECTIONS ELECTROMAGNETIQUES SUR AERONEFS]
R. C. Davidson and J. L. Boulay Mar. 1985 43 p refs In FRENCH
(Contract DRET-83-123)
(ONERA-RS-10/3466-PY) Avail: NTIS HC A03/MF A01

Electromagnetic transparence of aircraft structural elements is discussed. Laboratory measurements and parameters composing a wall transparence coefficient are studied. It is shown that an electric conductivity measurement device could be used to deduce the electromagnetic transmission rate. The device should be

developed from the CORAS transducer, which measures high range surface resistivity. Author (ESA)

N86-17638# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
A SINGLE-BALANCED MIXER FOR THE Ka BAND
Aake Bergquist Sep. 1985 22 p refs In SWEDISH; ENGLISH summary
(FOA-C-30407-E; ISSN-0347-3708) Avail: NTIS HC A02/MF A01; Research Institute of National Defence, Stockholm KR 50

Work with a single balanced millimeter wave mixer in the Ka band is described. The planar mixer uses ordinary, waveguide and microstrip, and finline as well as coplanar transmission lines. Measurements show that it has a minimum conversion loss of 5.8 dB and that the bandwidth at a conversion loss of 10 dB is 8GHz. Author (ESA)

N86-17639# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de la Physique Generale.
STUDY OF SURFACE DISCHARGES Final Report [ETUDE DES DECHARGES DE SURFACE]
S. Larigaldie, A. Brunet, F. Faure, and J. P. Marque May 1985 75 p refs In FRENCH
(Contract DRET-84/001)
(ONERA-RF-10/7236-PY) Avail: NTIS HC A04/MF A01

The electric discharges on a dielectric surface at normal pressure, reduced pressure, and simulated space environment are studied. The experimental facilities are described, but only preliminary results are available. Tests on a teflon dielectric specimen show that the low intensity of the electric discharge makes necessary the use of light complifiers to obtain a good enough photograph. Measurements show that the accepted physical models hold. Author (ESA)

N86-17640# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING Abstracts Only
30 Nov. 1984 50 p Transl. into ENGLISH from various Russian articles
(JPRS-UEE-84-016) Avail: NTIS HC A03/MF A01

This journal of electronics and electrical engineering has articles in the areas of aerospace and electronic systems, antennas and propagation, broadcasting, control systems electromagnetic compatibility, instrumentation and measurements, and magnetics. Some representative titles are: (1) magnetic field of excitation winding in experimental cryogenic turbogenerators; (2) measurement of velocity of objects moving near large reflecting surfaces; (3) 400 channel commutator for measurement of energy distribution in laser beams; and (4) use of microprocessors in control devices of switch units. For individual titles, see N86-17641 through N86-17655.

N86-17641# Joint Publications Research Service, Arlington, Va.
RESEARCH ON PROPAGATION OF DECIMETRIC RADIOWAVES AT HIGH LATITUDES c32
V. N. Trottskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 1 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 39-41 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

In order to study Polar summers during anomalously high signal values affecting radio propagation, research was conducted on decimetric waves over a sea path of 433 km, using antennas with gains of 44 and 46.2 dB, and over a 357 km tundra and woodland path using 46.2 dB gain antennas. In order to evaluate the signals an attenuation factor was used consisting of a ratio of the observed signal to free space reference signals which shows possible antenna losses. Fluctuations and levels are plotted for the indicator. Comparison with meteorological data showed that anomalously high levels are caused by nonuniformities in the refractive index of the lower troposphere which acts as a waveguide when temperature inversions caused by continent sea air movements occur. Amplitude fluctuations are caused by waveguide changes and interference phenomena. The results of the method utilizing attenuation factor statistics are considered better than those of the International Radio Consultive Committee (CCIR). Author

N86-17642# Joint Publications Research Service, Arlington, Va.
ONE-CHANNEL ADAPTIVE ANTENNA FOR TROPOSHERE MICROWAVE RELAY LINES c32
O. P. Frolov and V. M. Tsirlin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1985 p 2 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 28-31 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Adaptive antennas improve the performance of troposphere microwave relay lines (TMRL) by reducing fading and eliminating competing signals. The signal steadiness gain is equivalent to an increase in the number of channels and grows with antenna aperture. A horn system containing adjustable gaps is considered with regulation by microprocessor control of the input signal, which is digitized and compared with reference values. The signal processing algorithm uses a linear relation for the criteria which is not always satisfied and can lead to errors. In April 1981 experiments were made with a one-channel antenna coupled to a TMRL with a relay path of 389 km, an antenna power of 43 dB and an aperture of 20 x 20 m2. The horn contained 64 controllable elements. The results showed that with low signal levels the gain was a factor of 2, the noise reduction for a one-component signal in comparison with a simple relay was 5-7 dB, the gain for a three-component signal was 3-4 dB, and interference elimination amounted to 4-8 dB. It is concluded that adaptive antennas should be used on TMRL. Protection of control elements against high transmitter power levels should be studied. Author

N86-17643# Joint Publications Research Service, Arlington, Va.
METROLOGICAL PROVISION FOR MEASUREMENT OF RELATIVE ENERGY DENSITY DISTRIBUTION OVER BEAM CROSS SECTION AND OF BEAM DIVERGENCE IN PULSE LASERS c36
A. F. Kotyuk, V. B. Korshikov, B. M. Stepanov, S. V. Tikhomirov, and V. A. Yakovlev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 24-25 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 13-14 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Etalons for pulse lasers and radiators with normative relative energy density distribution over the beam cross section were developed and built for inspection at both governmental and industrial levels. The normative relative energy density distribution is converted into a smooth bell function by means of an apodized diaphragm, the latter having a definite transmission characteristic and being placed inside the laser resonator cavity. This diaphragm is formed by two total reflection prisms joined at their hypotenuse facet of one prism being flat and that of the other prism being spherical. Single mode radiation enters the diaphragm in pulses with quasi-plane fronts, while a uniform pumping field is produced by stable interference mirrors consisting of reflective films on substrate wedges. The monitored radiation parameters include pulse duration and pulse form as well as laser beam divergence and energy, the latter being determined calorimetrically with an energy reference standard and with a photoelectric converter. The accuracy of thus reproducing an energy density distribution unit was analyzed and evaluated in terms of standard deviation and nonremovable systematic error, the latter having three components associated respectively with the optical density of the photographic film, measurement of the energy density distribution curve at the lower end of the dynamic range, and discretization of the photometric field. Author

N86-17644# Joint Publications Research Service, Arlington, Va.
MULTICHANNEL COMMUTATORS OF ANALOG SIGNALS FOR MEASUREMENT OF ENERGY DISTRIBUTION OVER BEAM CROSS SECTION OF PULSE LASER c36

A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 25-26 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 14-16 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Instruments of measuring the energy distribution over the beam cross section of a pulse laser are checked against standards which include a primary instrument transducer, usually of the magnetic type, in the etalons as well as in reference and operating meters. Measurement of the energy distribution in the case of monopulse lasers with nonreproducible process characteristics and unknown space distributions requires a sufficiently wide dynamic range. The commutator of signals must have a dynamic range of 55 to 65 dB. Existing multichannel commutators of analog signals are inadequate for this application. A comparative design and performance evaluation of special purpose multichannel commutators for this application reveals that electromechanical ones such as Shl relays are superior in terms of low bias voltage with contactors closed, high ratio of open resistance to closed resistance, small temperature drift, wide dynamic range, low crosstalk level, and high stability, while contactless ones such optrons or transistor-diode switches excell in high speed. Accordingly, one or another type of commutator must be selected and design for a given energy distribution measuring instrument, also taking into account the required precision and sensitivity of digital voltmeters used with these instruments. Author

N86-17645# Joint Publications Research Service, Arlington, Va.
THE 400-CHANNEL COMMUTATOR FOR MEASUREMENT OF ENERGY DISTRIBUTION IN LASER BEAM **c36**
V. L. Chereugin and A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 26 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 16-18 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

An experimental study of a 400 channel commutator for measurement and analysis of the energy distribution over the beam cross section of pulse lasers was made for the purpose of evaluating its performance characteristics. This commutator transfers electric signals sequentially from 400 channels to the input of a digital high precision voltmeter, signals of a magnitude ranging from a few microvolts to tens of volts and remaining constant during the switching period. Each commutator element is a step-by-step switch and the effect of its performance on the accuracy of voltmeter readings depends on the switching cycle as well as the commutation characteristics. These were tracked through a set of three relays and a digital voltmeter continuously selecting one of two strobe signals. The voltmeter readings were analyzed by equipment including a start-stop cycle setter, a shaper of control pulses for a control module, with two amplifiers and two commutator control windings, and were also printed out after passage through a matching circuit. Calculations based on the voltmeter output data and on the equivalent electrical circuit of the commutator elements, with a high ratio of open resistance to closed resistance, yield an error of 5 x .0001 to 5 x .001 at temperatures of 20 to 65 C or one channel operating alone with crosstalk from the other 399 channels. Author

N86-17646# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF ERROR OF MEASUREMENT OF RELATIVE ENERGY OR POWER DENSITY DISTRIBUTION OVER CROSS SECTION OF LASER BEAM ON SPACE FACTOR OF MULTIELEMENT RADIATION TRANSDUCER **c36**
Ya. T. Zagorskiy and Yu. V. Karabak *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 18-19 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Measurements of the relative energy or power density distribution in a laser beam with an instrument including a multielement radiation transducer contain an error which depends on many factors. One component of this error, unlike of the error in the case of the absolute energy or power density distribution, is associated with the degree of area discretization in the diaphragm in the field of vision. This error component depends on the relative energy or power density distribution in the laser beam and on the number of sensor elements in the transducer as well as on their shape and their spacing density over the receiver surface. The relation is established analytically for the general case of an n-element radiation transducer feeding output signals through a commutator to an analog to digital converter. Numerical calculations for three different forms of radiation transducer, with n = 9000, 256, 100 respectively, reveal that a decrease of the spacing density of sensor elements will decrease the energy or power at the transducer input and increase the error introduced by the analog to digital converter, and that an increase of the number of sensor elements otherwise under the same conditions will also increase this error. Author

N86-17647# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC INSTRUMENT FOR MEASURING RELATIVE ENERGY DENSITY DISTRIBUTION IN BEAMS OF PULSE LASERS **c36**
V. I. Arbekov, M. V. Ulanovskiy, Ya. T. Zagorskiy, A. M. Levi, and A. I. Glazov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27-28 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 21-22 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The relative energy density distribution over the beam cross section of pulse lasers can be measured with both high space resolution and high accuracy when a photoelectric transducer array is used for this purpose. Such a transducer combines high sensitivity with a wide dynamic range. Its photoreceiver stage is preceded by a fiber optic light collector and is followed by an integrator feeding into an analog memory. Both integrator and memory are energized from a power supply controllable by a multichannel commutator with analog to digital and digital to analog conversion. Use of fiber optics allows spacing of the transducer components so as to almost completely eliminate any coupling between channels. The spectral range of the light collector is 0.4 to 2.0 microns. The photoreceiver consists of commercially produced FD-8K silicon photodiodes, each serving as a current generator and loaded by the input impedance of the operational amplifier built with microcircuits which converts each photodiode current into a voltage proportional to the radiation pulse energy. Author

N86-17648# Joint Publications Research Service, Arlington, Va.
ESTABLISHMENT AND USE OF TIME UNIFICATION SYSTEM FOR CIVIL AVIATION **c31**
M. M. Malyy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 30 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 28-30 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Precise and fail proof operation of the various services used by civil aviation throughout the territory of the USSR depends largely on synchronization, the latter requiring periodic indication of time scales and involving the concept of time unification. The principal users of a time unification system are the traffic control service and the flight crew. Since 1974 electromechanical hand-and-dial clocks in airports have been gradually replaced with modern signal clocks. Installation of secondary clocks in control towers, time encoding in the secondary clocks, and interfacing the clock room with the computer of the appropriate automatic control system are improvements made in the control tower. Time indicating and time keeping equipment is also installed in airplanes for tie-in with airports by means of radio signals over metric wave or decametric-wave communication channels. The necessary short range radio navigation system with the inclusion of satellites for transmittal of unified time information from airports to airplanes and equipment characterized by satisfactory technical accuracy and high stability with means for automatic or semiautomatic time

correction guaranteeing high reliability for a period of 10 years is produced. Author

N86-17649# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF VELOCITY OF OBJECT MOVING NEAR LARGE REFLECTING SURFACE
A. Ya. Ksenzenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 31-32 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 34-35 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Velocity measurement with a portable Doppler meter at radio frequencies is evaluated from the standpoint of range and accuracy, specifically in the case of an object such as an automobile moving at a low altitude above and parallel to a road which constitutes a long reflecting surface. The instrument case contains the transmitter and the receiver so that both can be regarded as being located at the same point. In addition to the main signal which has traveled along the Doppler(transmitter)-object-Doppler(receiver) path, stray components appear in the receiver which have traveled three other paths, component reflected by extraneous stationary objects, and one component transferred from transmitter to receiver directly inside the instrument case. The analysis is based on Doppler theory, including the indeterminacy principle, and yields the resultant error caused by all these interference signals. An experimental study made at the 10,525 MHz frequency has revealed several other factors causing deviations from theory, the most significant ones being nonideal scattering by the object and unevenness of the surface. Beats produced by stray components also severely limit the accuracy of Doppler velocity measurements. Author

N86-17650# Joint Publications Research Service, Arlington, Va.
METHOD OF MEASURING EMITTANCE OF THERMAL INSULATION MATERIALS AT LOW TEMPERATURES
L. Ya. Paderin, I. M. Baskin, and Yu. V. Filin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 33 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 39-40 (For primary document see N86-17640 08-31)
Avail: NTIS HC A03/MF A01

The main difficulty in measuring the emittance of thermal insulation materials at temperatures below 500 K, namely interference from background radiation, was overcome in an experimental test stand consisting of a vacuum chamber with a mechanism which rotates the test specimen inside. The specimen in the form of a flat disk is held firmly in a retainer fastened to the lower end of the vertical motor shaft. The temperature of the specimen is regulated by a cooler and a disk of conducting material with a controllable heater between them, the metal disk ensuring that the surface of the insulation material remains isothermal. Both the cooler and metal disk are eccentric relative to the axis of rotation so as not to obstruct the path for the radiant flux from the specimen surface through holes in the retainer to the radiation receiver undereath. Temperature and radiant energy are measured under a pressure not exceeding .01 Pa, whereupon the emissivity is calculated according to the Stefan-Boltzmann law. There are two main systematic errors in the emissivity readings. The source of one error is reflection of the radiant flux into the receiver by hot components of the apparatus. The source of another error is cooling of segments of the specimen passes through the cold zone between shield and radiation meter. The two errors are in opposite directions and, therefore, compensate one another to a large extent. Author

N86-17651# Joint Publications Research Service, Arlington, Va.
MAGNETIZATION REVERSAL IN TRIAXIAL SINGLE-DOMAIN PARTICLES **c70**
Viktor Avramovich Kufa and Ivan Petrovich Stadnik *In its* USSR Report: Electronics and Electrical Engineerings (JPRS-UEE-84-016) 30 Nov. 1984 p 39 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 5-8 (For primary document see N86-17640 08-31)
Avail: NTIS HC A03/MF A01

Magnetization reversal in triaxial single domain particles of magnetically hard materials such as the 52K11F alloy for hysteresis motors is analyzed for engineering design purposes. Because the characteristics of such a particle are determined by the orientation of the magnetic moment vector relative to the vector of the external magnetic field, the dependence of this orientation on the magnitude and the direction of the latter as well as on the original orientation is established here. The relation of the energy of a particle with the corresponding magnetic crystallographic anisotropy serves as a basis. Calculations are made in a rectangular system of coordinates whose axes coincide with the three directions of easy magnetization. The relations thus obtained reveal three ranges of original angle between the magnetic moment vector of the particle and the intensity vector of the applied external magnetic field. When this angle is small, increasing the intensity of the external magnetic field will cause the magnetic moment vector to rotate toward the magnetic field vector. This process is reversible. Further calculations yield both critical original angles and the critical magnitudes of the external magnetic field at which jumpwise rotation of the magnetic moment vector will occur. Author

N86-17652# Joint Publications Research Service, Arlington, Va.
DETERMINING SPATIAL ORIENTATION OF AXES OF ELLIPTICAL MAGNETIC FIELD **c70**
Leonid Mikhaylovich Rudnitskiy, Valeriy LVovich Frumin, Boris Avramovich Guyetskiy, and Nikolay Zekharovich Klimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 8-11 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The rotating magnetic field in induction motors is often elliptical, because of asymmetry of the polyphase line voltages or structural asymmetry in the machine. For an accurate analysis of electromechanical energy conversion in such a machine, one must then take into account the ellipticity of the magnetic field with the attendant nonuniformity of saturation. A generalized two field model of an induction motor is proposed for this purpose, with superposition of two mutually orthogonal elliptical pulsating fields in stator coordinates. The self inductances and the mutual inductances can be subsequently calculated on this basis. The spatial orientation of the two ellipses, specifically of their axes, needs to be determined first and this is done here for the most general case of an asymmetric machine with m stator phases and n rotor phases under asymmetric input voltages. The magnetizing force of any stator phase and any rotor phase is calculated accordingly, then the resultant magnetizing force and its space distribution. The major axis and the minor axis of the resultant ellipse correspond to the direction of the respectively maximum and minimum magnetizing force. Numerical results converging after six iterations are shown for a machine with m 3 stator phases and n = 2 rotor phases. Author

N86-17653# Joint Publications Research Service, Arlington, Va.
MAGNETIC FIELD OF EXCITATION WINDING IN EXPERIMENTAL CRYOGENIC TURBOGENERATOR **c70**
Iosif Natanovich Grinbaum and Yuriy Nikolayevich Vvedenskiyk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40-41 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 14-19 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The magnetic field of the excitation of winding in a cryogenic turbogenerator is evaluated on the basis of experimental data pertaining to a 2 MW machine. The magnetic field distribution was measured with 56 induction transduced mounted in three mutually orthogonal planes. Measurements were made with the superconducting excitation coils without a shield and with ferromagnetic external shield. Without a shield, the emf of the

transducers was recorded with a light beam oscillograph and the amplitudes of its first harmonic were calculated from the oscillograms. From these data were then calculated the longitudinal profiles of the three components (radial, tangential, axial) of the first harmonic of magnetic induction, all referred to the radial component in the center section at a distance of 0.25 m from the axis as the base. Corrections were made for imprecise orientation of the transucers, with an error of approximately 1 deg. The data pertaining to the super-conducting excitation coils with a shield were evaluated on an Argus-500 computer. A comparison of theoretically estimated experimental error and calculation error indicates that the experimental error is consistently smaller, these estimates corresponding to the maximum discrepancy, so that the results of this experimental study appear to be reliable. Author

N86-17654# Joint Publications Research Service, Arlington, Va.
REVERSIBLE COMPONENT OF MAGNETIC INDUCTION IN MAGNETICALLY SOFT MATERIALS DURING MAGNETIZATION REVERSAL c70
Yuriy Nikolayevich Maslov, Oleg Nikolayevich Khmaruk, and Viktor Vasilyevich Krokhim *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 41-42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 45-50 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The reversible component of magnetic induction in magnetically soft materials is evaluated as function of the magnetic field intensity. The analysis is based on two mechanisms operating during dynamic magnetization reversal: reversible movement of domain walls and reversible rotation of the magnetization vector within a domain. The material is assumed to be initially in a state corresponding to negative remanence and then magnetized by magnetic field pulses of various durations to various levels up to saturation in the positive direction with subsequent relaxation to a residual level, ensuring that the irreversible component of magnetic induction be the same after each pulse. The process corresponds to fourth and first quadrants of the hysteresis loop. Static characteristics are extended to dynamic conditions, also taking into account the distribution of magnetic induction over the volume of material with alternation of positive and negative maxima. Experimental data pertaining to 79 Moly Permalloy ribbon agree closely with theoretical calculations based on the Weiss model, which validates this method of analyzing dynamic magnetization reversal. Author

N86-17655# Joint Publications Research Service, Arlington, Va.
EQUIVALENT-CIRCUIT CALCULATIONS FOR BUILT-UP MAGNETIC STRUCTURES BY PROJECTION METHOD c70
Aleksandr Aleksandrovich Drozdov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 50-60 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

An equivalent circuit for a built-up multishell magnetic structure is developed by the method of projection. Such a structure contains three kinds of elements: segments of ferromagnetic material and joints between them with nonlinear characteristics and air gaps with linear ones. The gist of this method is to satisfy at each step any one of Kirchhoff's laws as well as the relation between magnetic flux and magnetizing force, and then correcting the circuit on the basis of Kirchhoff's other law. The algorithm of solving the systems of algebraic equations for both magnetic flux vector and magnetizing force vector is aided by matrix notation and an equivalent resistance grid. It includes the use of magnetization curves, piecewise linearized, one for the high-permeability core material and one for the low-permeability materials of the joints. The eleven steps of this algorithm have been formalized in a flow chart and programmed in ALGOL-60 for computers. Typical numerical results referring to the flux density distribution are identical to the results obtained for this example by the conventional method of linearization. Author

N86-17444# Shanghai Transit Co. (China).
CALCULATION METHODS FOR SHORT-CIRCUIT CURRENTS IN THREE-PHASE BRIDGE RECTIFIER CIRCUITS
Fan Yuan-wu *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 101-103 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17445# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
TEMPERATURE DERIVATIVE BATTERY CHARGE CONTROL
H. J. N. Spruijt *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 107-122 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17446# Toulouse Univ. (France).
USE OF IMPEDANCE MEASUREMENTS TO MODEL NICKEL-CADMIUM BATTERIES [EMPLOI DE MESURES D'IMPEDANCE POUR LA MODELISATION DES ACCUMULATEURS NICKEL-CADMIUM]
M. Comtat, P. Delorme, F. Baron (ESA/ESTEC, Noordwijk, Netherlands), and A. Capel (Thomson CSF, Toulouse, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 123-128 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17447# Toulouse Univ. (France).
IMPROVEMENT OF THE PROCESS FOR ELECTROCHEMICAL IMPREGNATION OF NICKEL HYDROXIDE ELECTRODES [AMELIORATION DU PROCEDE D'IMPREGNATION ELECTRO-CHIMIQUE D'ELECTRODES D'HYDROXYDE DE NICKEL]
M. Comtat, B. Lafage, and J. Leonardi (Societe SAFT, Bordeaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 129-133 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17448# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE RESULTS OF SOME END OF LIFE TESTS ON THE OTS BATTERY
P. Leggett, H. Lechte, and A. Sepers *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 135-143 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17451# Technische Hochschule, Aachen (West Germany). Inst. fuer Stromrichtertechnik und elektrische Antriebe.
RECOVERY CIRCUIT FOR SNUBBER ENERGY IN POWER ELECTRONIC APPLICATIONS WITH HIGH SWITCHING FREQUENCIES
J. C. Bendien, H. vanderBroeck, and G. Fregien *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electron. Specialists Conf. May 1985 p 165-170 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17452*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGNING HIGH FREQUENCY ac INDUCTORS USING FERRITE AND MOLYPERMALLOY POWDER CORES (MPP)
W. T. McLyman and Albert P. Wagner *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 171-175 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17453# Fabrica Italiana Apparecchi Radio S.p.A., Milan (Italy).
THE 230W TRAVELING WAVE TUBE AMPLIFIER (TWTA)

POWER SUPPLY DESIGN
A. Gasparini and A. Bonati *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 179-185 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17454# Selenia S.p.A., Rome (Italy).
A 20 GHz/30 W TRAVELING WAVE TUBE AMPLIFIER (TWTA) FOR OLYMPUS TRANSPONDER
S. Roccucci, C. Sciangula, and D. Adirosi *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 187-197 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17455# Alcatel Thomson Espace, Courbevoie (France).
APPLICATION OF CURRENT-CONTROL MODULATOR (MC2) CONTROL FEEDBACK FOR 12 GHz 20 W ELECTRIC POWER CONDITIONER (EPC) FOR TELECOM SATELLITE
J. P. Desne and C. Peyrotte *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 199-206 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN OF HIGH-VOLTAGE, HIGH-POWER, SOLID STATE REMOTE POWER CONTROLLERS FOR AEROSPACE APPLICATIONS
John C. Sturman *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 207-216 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17457# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
DISCHARGE DETECTION IN HIGH VOLTAGE FLIGHT HARDWARE
J. C. J. Eeman *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 217-222 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17458# Rockwell International Corp., Cedar Rapids, Iowa.
AN ANALYTICAL INVESTIGATION OF CURRENT-INJECTED CONTROL FOR CONSTANT-FREQUENCY SWITCHING REGULATORS
Daniel M. Mitchell *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 225-233 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17459# Politecnico di Milano (Italy). Inst. of Nuclear Engineering.
EXACT CONTINUOUS MODELS OF PULSE WIDTH MODULATION (PWM) REGULATORS IN BOTH CONTINUOUS AND DISCONTINUOUS CONDUCTION MODES
P. Maranesi and V. Varoli *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 235-238 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17460# Hasler Ltd., Bern (Switzerland).
POWER SWITCHING CELL MODELING: AN EASY WAY
A. S. Kislovski *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 239-244 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17462# International Business Machines Corp., Poughkeepsie, N.Y.
IMPROVING THE RESPONSE TIME OF A SWITCHING REGULATOR USING SENSIT AND DESIGN/ASTAP
John D. Page and Terrence R. Scott *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 257-270 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17463# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
TIME DOMAIN ANALYSIS OF AN S3R SYSTEM
L. G. VandenBerghe *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 271-278 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17464# Societe Crouzet, Valence (France).
DESIGN AND DEVELOPMENT OF A CURRENT LIMITED SOLID STATE HYBRID SWITCH
C. Neveu and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 281-285 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17466# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Electrotechnique et d'Electronique Industrielle.
STUDY OF A RESONANT CONVERTER USING POWER TRANSISTORS IN A 25 kW X-RAY TUBE POWER SUPPLY
Y. Cheron, H. Foch, and J. Salesses (Thomson C.G.R., Issy-les-Moulineaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 295-306 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-17656 Virginia Polytechnic Inst. and State Univ., Blacksburg.
VORTICITY SHEDDING OVER TWO-DIMENSIONAL BODIES Ph.D. Thesis
Dimitrios Mathioulakis 1985 248 p
Avail: Univ. Microfilms Order No. DA8516159

The vorticity shedding characteristics in attached and separated regions were investigated over three configurations, namely a backward facing circular arc, an ellipse at an angle of attack and a pitching airfoil. A fully automated data acquisition system was developed, including a two-component Laser-Velocimetry system in backscatter mode, an accurately controlled traversing mechanism and a MINK-11 minicomputer. Two-component velocity measurements were obtained over the above mentioned bodies, with steady and unsteady free streams. Emphasis was concentrated on the separation region, the free-shear layers and the wake downstream of these bodies. Two inviscid vortex models were developed to predict two different flow phenomena, namely the separated flow over a circular cylinder started impulsively from rest and propagating stall over a linear stationary cascade.

Dissert. Abstr.

N86-17657 Lehigh Univ., Bethlehem, Pa.
RESPONSE OF VISCOELASTIC SLAB TO VISCOUS SLAB TO

VISCOUS FLUID FLOW Ph.D. Thesis
Cahit Ahmet Evrensel 1985 124 p
Avail: Univ. Microfilm Order No. DA8516249

The dynamics of harmonic wave trains on the interface between compliant coatings and boundary layer flows is explored theoretically. The coating is treated as an infinite, elastic or viscoelastic slab of finite thickness, bonded to a rigid half space. The viscoelastic behavior is modeled by an isotropic Voigt constitutive model. The first model studied uses a modified potential flow to approximate boundary layer flow. For this model, surface shear is assumed to be zero and the two media are coupled through normal stress and velocity in the vertical direction. The pressure-surface-elevation relation predicted by the potential flow theory is modified by empirical parameters such as amplitude coefficient and phase shift. As a second model, a two dimensional, perturbed boundary layer flow bounded by a viscoelastic slab is considered. The results obtained show that this model is capable of explaining most of the characteristics of the interaction mechanism between the viscoelastic slab and boundary layer flow. Dissert. Abstr.

N86-17658 Connecticut Univ., Storrs.
HORSESHOE VORTEX FORMATION AROUND A CYLINDER Ph.D. Thesis
Wayne Alan Eckerle 1985 299 p
Avail: Univ. Microfilms Order No. DA8516183

A turbulent boundary layer approaching a local obstruction, such as when annulus wall boundary layers encounter airfoils and support struts, creates a critical problem in gas turbine engines. The slower portion of the approaching boundary layer cannot negotiate the adverse pressure gradient generated by the obstruction and consequently separates from the endwall. The resulting flow field includes a horseshoe vortex that is swept downstream around the body. The separation affects both the local heat transfer coefficients and aerodynamic losses in the endwall region. This investigation evaluated the detailed flow processes that lead to the symmetric horseshoe vortex formation around a large-diameter cylinder. Test conditions included a freestream velocity of 30.5 m/sec, a Reynolds number based on cylinder diameter of 5.5 x 10 to the 5th power, and a boundary-layer thickness equal to 13 percent of the cylinder diameter. The final report presents endwall and cylinder surface flow visualizations, endwall and cylinder static pressure distributions, and five-hole probe measurements in the separation region. Dissert. Abstr.

N86-17659 State Univ. of New York, Stony Brook.
LAMINAR FORCED CONVECTIVE HEAT TRANSFER OF POWER LAW FLUIDS IN ISOSCELES TRIANGULAR DUCTS WITH PERIPHERAL WALL CONDUCTION Ph.D. Thesis
Jin-An Joseph Cheng 1984 344 p
Avail: Univ. Microfilms Order No. DA8513872

The results of an investigation are presented for non-Newtonian fluid heat transfer studies in noncircular ducts. Laminar fully developed flow of a purely viscous fluid is analyzed with two power law fluid models in isosceles triangular ducts. Three major components are covered: (1) The temperature distributions and heat transfer coefficients for a hydrodynamically and thermally fully developed newtonian fluid for the boundary condition of constant axial heat flux with peripheral wall conduction; (2) the velocity distributions and the relationship between the friction factor and the generalized Reynolds number for fully developed power law fluids, two rheological models, as well as Kozicki's geometric parameter method, are in agreement with Chang's experimental data within their ranges; and (3) The temperature distributions for a hydrodynamically and thermally fully developed power law fluid for constant axial heat flux with peripheral wall conduction.
Dissert. Abstr.

N86-17660 Clarkson Univ., Potsdam, N.Y.
FINITE ELEMENT ANALYSIS OF TRANSIENT FORCED CONVECTION AND CONJUGATE HEAT TRANSFER Ph.D. Thesis
Cyrus Aidun 1985 138 p
Avail: Univ. Microfilms Order No. DA8517666

A flexible and multipurpose computer code for the numerical solution of the transient, incompressible Navier-Stokes and energy equations is developed. The numerical method is based on Finite Element spatial discretization of the partial differential equations. A new semi-implicit time integration technique has been developed and used for the solution of the resulting system of ordinary differential equations. A fully implicit time integration technique has also been included as an additional option in the code. This method is applied to solve the transient heat transfer from a circular cylinder started impulsively from rest with sudden increase in the surface temperature. The evolution of the local and average heat transfer coefficients has been computed for various Reynolds numbers. The next problem considered is the heat transfer from a cylinder fluctuating in uniform cross flow. The results show that a time lag always exists between the heat transfer coefficient and the velocity fluctuation. In the next problem the solid and the adjacent fluid regions are considered simultaneously as a conjugate domain. Dissert. Abstr.

N86-17661 Pennsylvania State Univ., University Park.
A THEORETICAL AND EXPERIMENTAL STUDY OF NONCONDENSIBLE TURBULENT BUBBLY JETS Ph.D. Thesis
Tai-Yen Sun 1985 217 p
Avail: Univ. Microfilms Order No. DA8516099

A theoretical and experimental investigation of the transport properties and dispersion of bubbles in noncondensible turbulent bubbly round jets is described. Three two-phase models were developed to predict the flow and evaluated by comparison of predictions with measurements completed during this investigation. The three models are: (1) locally homogeneous flow (LHF) model, where slip between the phases was neglected; (2) deterministic separated flow (DSF) model, where slip was considered, but the effects of bubble interactions with turbulence were ignored; and (3) a stochastic separated flow (SSF) model, where effects of both interphase slip and bubble/turbulence interactions were considered. All three models used a k-epsilon-g turbulence model to specify turbulent properties of the continuous phase. Experiments considered bubbly air/water jets injected vertically upward in still water. The tests included three jets with initial volume fractions of 2.4%, 4.8% and 9.1%, and nearly monodisperse bubble diameters of 0.99, 1.04 and 1.08 mm, respectively, at the jet exit.
Dissert. Abstr.

N86-17662 Iowa Univ., Iowa City.
DEVELOPMENT OF A TWO-SCALE TURBULENCE MODEL AND ITS APPLICATION Ph.D. Thesis
Kanwerdip Singh 1985 254 p
Avail: Univ. Microfilms Order No. DA8518873

The use of second order closure turbulence model in predicting turbulent flows is known to be more successful than the classical mixing length model. However, it is found that if the turbulence constants are not altered or modified, the second order closure turbulence model is unable to predict satisfactorily for some flows such as round jet and wake flows. In order to improve the predictability of the second order closure model, the present work proposes to consider two turbulent scales in the modeling of turbulent flows. One of these scales is based on using the turbulent kinetic energy, k, and its dissipation rate, epsilon, to characterize the large energy containing eddies. The other scale is based on the dissipation rate, epsilon, and the kinematic viscosity, v, to characterize the small energy dissipating eddies. The second scale is based on the well known Kolmogorov hypothesis that dissipation of turbulent kinetic energy occurs primarily at small eddies. The turbulence model derived based on the concept of two different scales is called the two-scale turbulence model. The existing turbulence model which is modelled based on the one-scale concept of k and epsilon is called the one-scale turbulence model. The two-scale turbulence model is then applied to predict turbulent free shear flows and recirculating flows. Dissert. Abstr.

N86-17663 Engineering Sciences Data Unit, London (England).
FLUID TRANSIENTS IN PIPES. REDUCTION AND CONTROL OF PRESSURE SURGES IN LIQUIDS
Nov. 1984 89 p refs

(ESDU-84013; ISBN-0-85679-475-9; ISSN-0141-4011) Available as part of the ESDU sub-series on fluid mechanics, internal flow. For information on all ESDU validated engineering data, contact ESDU International, 251-259 Regent Street, London, W1R 7AD, England, or Suite 200, 1495 Chain Bridge Road, McLean, Va. 22101, USA

ESDU 84013 provides a simplified graphical method for predicting maximum pressure changes in liquid filled pipework systems that may be treated as one-line systems. The method applies to pressures induced by partial or total valve closure, covering all common valve types, or pump trips. Data are also given for the estimation of the size of air vessel, situated just downstream of a pump, to protect against excessive upsurge and downsurge pressure changes following pump trip. A computer program is included to analyze transients in one-line systems and does not use the simplifying assumptions necessary for the graphical data. Practical worked examples, illustrating the use of the methods, are included and guidance is given on the data required for a full fluid transients analysis going beyond the scope of ESDU 84013. Author

N86-17664 Engineering Sciences Data Unit, London (England).
LOW-FIN STAGGERED TUBE BANKS: HEAT TRANSFER AND PRESSURE-LOSS FOR TURBULENT SINGLE-PHASE CROSSFLOW
Jul. 1985 24 p refs
(ESDU-84016; ISBN-0-85679-478-3; ISSN-0144-402X) Available as part of the ESDU sub-series on heat transfer. For information on all ESDU validated engineering data, contact ESDU International, 251-259 Regent Street, London, W1R 7AD, England, or Suite 200, 1495 Chain Bridge Road, McLean, Va. 22101, USA

ESDU 84016 gives new correlations for calculating the external heat transfer and pressure loss for flow over low fin tube banks. Low fins are fins of limited height formed on the tube outside wall, typically by cold rolling. The correlations were derived from a regression analysis of experimental data from various sources covering 14 configurations. They are applicable for Reynolds numbers between 1000 and 800,000, fin densities of 11 to 32 fins per inch (425 to 1250 fins per meter), with heights of 0.03 to 0.1 inch (0.75 to 3 mm) on tubes of outside diameter 0.5 to 1.25 inch (13 to 40 mm). The method over 93 results predicts heat transfer coefficient with a standard deviation of 6.6 per cent and over 81 results predicts pressure drop with a standard deviation of 7.7 per cent. A practical worked example illustrates the use of the data. Author

N86-17665*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Mechanical and Aerospace Engineering.
LOW REYNOLD'S NUMBER BOUNDARY LAYERS IN A DISTURBED ENVIRONMENT Ph.D. Thesis - August, 1985 - Final Report
Dong-Kee Paik and Eli Reshotko Jan. 1986 98 p
(Grant NAG3-230)
(NASA-CR-175031; NAS 1.26:175031) Avail: NTIS HC A05/MF A01 CSCL 20D

Studies of flat plate boundary layer development were made in a low speed wind tunnel at turbulence levels from 2%to 7%. Only transitional and turbulent flows were observed in the range 280 < Re sub theta 700. The mean turbulent velocity profiles display law-of-the-wall behavior but have negligible wake component. The u' disturbance profiles compare well with those of other experiments, the peak value of u'/u sub tau being about 2.5. The effect of free-stream turbulence level on turbulent skin friction can be nicely correlated with those of other investigations on a plot of u sub e/u sub tau versus Re sub theta. A discussion on the u' spectra for the transitional boundary-layers is presented. Author

N86-17666# British Aerospace Aircraft Group, Preston (England). Wind Tunnel Dept.
HOT GAS LABORATORY TWIN NOZZLE CALIBRATION
A. P. Winstanley 1 Jul. 1985 37 p refs
(BAe-ARG-200) Avail: NTIS HC A03/MF A01

The quality of a twin nozzle flow is investigated. The assembly was manufactured to produce high temperature jet related data relevant to VSTOL aircraft when adapted to a wind tunnel hot gas facility. The twin nozzles are of an Ni-resistant flake cast iron construction whereas the standard 120 mm diameter single nozzle is a stainless steel, water-cooled fabrication. A calibration rake was used to acquire pressure and temperature data over an array of data points. The tests show that the construction method is satisfactory. The total pressure quality in the exit plane is good. A negative temperature gradient is found along the y axis. The nozzle reference pressure is a good indication of the average total pressure in the exit plane. Author (ESA)

N86-17667# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DEVELOPMENT OF A TWO-DIMENSIONAL/AXISYMMETRIC IMPLICIT NAVIER-STOKES SOLVER USING FLUX-DIFFERENCE SPLITTING CONCEPTS AND FULLY GENERAL GEOMETRY Final Report, 1 Mar. 1984 - 28 Feb. 1985
R. G. Hindman Sep. 1985 64 p Prepared in cooperation with Calspan Field Services, Inc., Arnold AFS, Tenn.
(AD-A159776; AEDC-TR-85-43) Avail: NTIS HC A04/MF A01 CSCL 20/4

Theoretical background and several basic test cases are presented for a new, time dependent Navier-Stokes solver for two-dimensional and axisymmetric flows. The goal of the effort is to invoke state-of-the-art computational fluid dynamics (CFD) technology to improve modeling of viscous phenomenal and to increase the robustness of CFD analysis. The original motivation was inadequate representation of supersonic ramp-induced separation by existing CFD codes. The present work addresses that inadequacy by using modern numerical methods which accurately model signal propagation in high-speed fluid flow. This technique solves the Navier-Stokes equations in general curvilinear coordinates in a four-sided domain bounded by a wall, and upper boundary opposite the wall, an inflow boundary, and an outflow boundary. The interior algorithm is a flux-difference splitting method similar to that of Yang, Lombard, and Bershader, but is blended into a second order, implicit factored delta form. With implicitly treated boundary conditions, the solution is performed using a block tridiagonal method followed by an explicit updating of the boundaries. The resulting scheme satisfies the global conversation requirement to within the order of accuracy of the algorithm. The grid is generated using a relaxation Poisson solver. A systematic and rigorous development of the complete method is presented. Initial steps in code validation include successful reproduction of Couette and Blasius solutions. GRA

N86-17668# Physical Dynamics, Inc., Bellvue, Wash.
EXPERIMENTAL GENERATION OF STRATIFIED SHEAR FLOWS Final Report, 15 Sep. 1984 - 14 Mar. 1985
D. P. Delisi 26 Aug. 1985 30 p
(Contract F49620-84-C-0092)
(AD-A160304; PD-NW-85-340R; AFOSR-85-0873TR) Avail: NTIS HC A03/MF A01 CSCL 20/4

An annular, stratified flow tank was designed and built to study gravity wave, mean flow (critical layer) interactions. The tank contained stratified salt water, and an initial shear profile was generated by blowing air over the water surface. Internal gravity waves were generated by displacing the bottom floor of the tank in a known way. A preliminary critical layer experiment was performed to prove the feasibility of studying critical layer interactions in the experimental facility. Quantitative measurements of mean flow velocities, velocity perturbations, and vertical wavelengths were obtained. GRA

N86-17669# Oak Ridge National Lab., Tenn.
IMPLICIT MIXED INTERPOLATION FINITE ELEMENT ALGORITHM FOR TIME DEPENDENT VISCOUS FLOWS UTILIZING A FRONTAL SOLUTION TECHNIQUE
B. R. Becker and J. B. Drake 1985 29 p Presented at the 5th International Conference on Mathematical Modelling, Berkeley, Calif., 29 Jul. 1985

(Contract DE-AC05-84OR-21400)
(DE85-016357; CONF-850758-2) Avail: NTIS HC A03/MF A01

A finite element algorithm is described which implements the Galerkin approximation to the Navier-Stokes equations and incorporates five predominate features. Although none of these five features is unique to this algorithm, their orchestration, as described in this paper, results in an algorithm which is not only easy to implement but also stable, accurate, and robust, as well as computationally efficient. The zero stress natural boundary condition is implemented which permits calculation of the outflow velocity distribution. A nine-node, Lagrangian, isoparametric, quadrilateral element is used to represent the velocity while the pressure uses a four-node, Lagrangian, superparametric element coincident with the velocity element. The easily implemented, computationally efficient frontal solution technique is used to assemble the element coefficient matrices, impose the boundary conditions, and solve the resulting linear system of equations. An implicit backward Euler time integration rule provides a very stable solution method for time dependent problems. A Picard scheme with a relatively large radius of convergence is used for iteration of the non-linear equations at each time step. Results are given from the calculations of two dimensional, steady-state and time-dependent convection dominated flows of viscous incompressible fluids. DOE

N86-17670# Oak Ridge National Lab., Tenn.
VAPOR COMPRESSION HEAT PUMP SYSTEM FIELD TESTS AT THE TECH COMPLEX
V. D. Baxter 1985 32 p refs Presented at the Energy Sources: Conservation and Renewables, Washington, D.C., 27 Apr. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016364; CONF-8504174-1) Avail: NTIS HC A03/MF A01

The Tennessee Energy Conservation In Housing (TECH) complex has been utilized since 1977 as a field test site for several novel and conventional heat pump systems for space conditioning and water heating. Systems tested include the Annual Cycle Energy System (ACES), solar assisted heat pumps (SAHP) both parallel and series, two conventional air-to-air heat pumps, an air-to-air heat pump with desuperheater water heater, and horizontal coil and multiple shallow vertical coil ground-coupled heat pumps (GCHP). A direct comparison of the measured annual performance of the test systems was not possible. However, a cursory examination revealed that the ACES had the best performance. However, its high cost makes it unlikely that it will achieve widespread use. Costs for the SAHP systems are similar to those of the ACES but their performance is not as good. Integration of water heating and space conditioning functions with a desuperheater yielded significant efficiency improvement at modest cost. The GCHP systems performed much better for heating than for cooling and may well be the most efficient alternative for residences in cold climates. DOE

N86-17671# Department of Energy, Washington, D. C.
MAGNETICALLY FOCUSED LIQUID DROP RADIATOR Patent Application
T. E. Botts (Brookhaven National Lab., Upton, N.Y.), J. R. Powell (Brookhaven National Lab., Upton, N.Y.) , and R. Lenard, inventors (to DOE) Filed 10 Dec. 1984 27 p
(Contract DE-AC02-76CH-00016)
(DE85-017735; US-Patent-Appl-SN-679841) Avail: NTIS HC A03/MF A01

A magnetically focused liquid drop radiator for application in rejecting energy from a spacecraft is described. It is characterized by a magnetizable liquid or slurry disposed in operative relationship within the liquid droplet generator and its fluid delivery system, in combination with magnetic means disposed in operative relationship around a liquid droplet collector of the LDR. The magnetic means are effective to focus streams of droplets directed from the generator toward the collector, thereby to assure that essentially all of the droplets are directed into the collector, even though some of the streams may be misdirected as they leave the generator. The magnetic focusing means is also effective to suppress splashing of liquid when the droplets impinge on the collector. DOE

N86-17672# Lawrence Livermore National Lab., Calif.
ARTIFICIAL VISCOSITY Q ERRORS FOR STRONG SHOCKS AND MORE-ACCURATE SHOCK-FOLLOWING METHODS
W. F. Noh 19 Jul. 1985 32 p Presented at the International Conference on Fluid Dynamics, Reading, Engl., 1 Apr. 1985
(Contract W-7405-eng-48)
(DE85-017830; UCRL-93008; CONF-8504150-3) Avail: NTIS HC A03/MF A01

The artificial viscosity (Q) method for von Neumann-Richtmyer is a tremendously useful numerical technique for following shocks wherever and whenever they appear in the flow. We show that it must be used with some caution, however, as serious Q-induced errors (approx. =100%) can occur in some strong shock calculations. We investigate three types of Q errors: (1) Excess Q heating, of which there are two types: (a) excess Wall Heating on shock formation and (b) Shockless Q Heating; (2) Q errors when shocks are propagated over a non-uniform mesh; and (3) Q errors in propagating shocks in spherical geometry. As a basis of comparison, we use as our standard the Lagrangian formulation with Q = C0 sup 2 rho L sup 2 (u sub x) sup 2. This standard Q is compared with Noh's (Q and H) shock-following method, which employs an artificial heat-flux term (H) in addition to Q, and with the (non-Q) PPM method of Colella and Woodward. Both the (Q and H) and PPM methods (particularly when used with an adaptive shock-tracking mesh) give superior results for our test problems. In spherical geometry, Schulz's tensor Q formulation of the hydrodynamic equations proves to be most accurate. DOE

N86-17673# Argonne National Lab., Ill.
HEAT TRANSFER FROM A HIGH TEMPERATURE CONDENSABLE MIXTURE. 2: SEDIMENTATION OF FOG CONDENSATE
D. W. Condiff, D. H. Cho, and S. H. Chan 1985 9 p Presented at the National Heat Transfer Conference, Denver, Colo., 4 Aug. 1985 Prepared in cooperation with Wisconsin Univ., Milwaukee
(Contract W-31-109-eng-38)
(DE85-018377; CONF-850810-26) Avail: NTIS HC A02/MF A01

A kinematic wave analysis of fog sedimentation is employed to relate growth of a fog condensate deposit layer to radiation generated fog formation rates. The increase of surface radiation absorptivity with deposit layer thickness promotes a feedback mechanism for higher growth rates, which is evaluated in detail. DOE

N86-17674# Argonne National Lab., Ill.
CONDENSATION OF THE UNDERSIDE OF A HORIZONTAL SURFACE IN A CLOSED VESSEL
R. P. Stein, D. H. Cho, and G. A. Lambert 1985 8 p Presented at the National Heat Transfer Conference, Denver, Colo., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018379; CONF-850810-27) Avail: NTIS HC A02/MF A01

Heat transfer measurements were made for film condensation of steam on the underside of a horizontal surface in a closed vessel. Data were obtained as condensing heat flux vs. temperature difference at constant pressures and noncondensable gas (air) contents. Heat fluxes varied from about 0.04 to 0.8 MW/m sq. (13,000 to 250,000 Btu/h-ft sq.) and temperature differences from about 30 to 150(0)C. Pressures ranged from 0.31 MPa (45 psia) to 1.24 MPa (180 psia). Gas contents ranged from the maximum the system could contain at atmospheric pressure to negligible amounts. It appears that the effect of noncondensable gas can be correlated reasonably well based on a heat-mass transfer analogy. However, the data for negligible gas contents exhibit a significant effect of the system pressure which cannot be accounted for by existing correlations or models such as the one due to Gerstmann and Griffith. DOE

N86-17675# Pennsylvania Univ., Philadelphia. Dept. of Mechanical Engineering and Applied Mechanics.

ANALYSIS OF THE SOLAR POWERED/FUEL ASSISTED RANKINE CYCLE COOLING SYSTEM. PHASE 1: REVISION
N. Lior, K. Koai, and H. Yeh Apr. 1985 252 p
(Contract DE-AC03-78ET-20110)
(DE85-016173; DOE/ET-20110/5-Rev) Avail: NTIS HC A12/MF A01

The subject of this analysis is a solar cooling system which consists of a conventional open-compressor chiller, driven by a novel hybrid steam Rankine cycle. Steam is generated by the use of solar energy collected at about 100C, and it is then superheated to about 600C in a fossil-fuel fired superheater. The steam drives a novel counter-rotating turbine, some of the heat from it is regenerated, and it is then condensed. Thermal storage is implemented as an integral part of the cycle, by means of hot-water which is flashed to steam when needed for driving the turbine. For the solar energy input, both evacuated and double-glazed flat-plate collectors were considered. A comprehensive computer program was developed to analyze the operation and performance of the entire power/cooling system. Each component was described by a separate subroutine to compute its performance from basic principles, and special attention was given to the parasitic losses, including pumps, fans and pressure drops in the piping and heat exchangers, and to describe the off-design performance of the components. The thermophysical properties of the fluids used are also described in separate subroutines. Transient simulation of the entire system was performed on an hourly basis over a cooling season in two representative climatic regions (Washington, DC, and Phoenix, AZ) for a number of system configurations. DOE

N86-17676# Sandia National Labs., Albuquerque, N. Mex.
EXPERIMENTAL STUDY OF THE SHOCK WAVE-TURBULENT BOUNDARY LAYER INTERACTION
D. W. Kuntz, V. A. Amatucci, and A. L. Addy 1985 7 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985 Prepared in cooperation with Illinois Univ., Urbana
(Contract DE-AC04-76DP-00789)
(DE85-016583; SAND-85-1779C; CONF-851125-9) Avail: NTIS HC A02/MF A01

An experimental investigation was conducted to study the interaction between a shock wave and a turbulent boundary layer. The boundary layer was formed on the floor of a wind tunnel operating with a free-stream Mach number of 2.94 and a Reynolds number based on boundary layer thickness of 3.1 x 10 to the 5th power. A 20 degree compression corner model was used to generate the interaction flowfield. Measurement techniques used in this investigation included Schlieren photography, surface static pressure measurement, surface streak pattern measurement, and laser Doppler velocimetry (LDV). The LDV was used to make two-color, two-component coincident velocity measurements within the redeveloping boundary layer downstream of the interaction. The results of the LDV measurements indicted that both the mean and turbulent flow properties of the boundary layer were significantly altered by the interaction, with large increases in the longitudinal turbulence intensity and Reynolds stress observed in the redeveloping boundary layer. DOE

N86-17677# Midwest Research Inst., Golden, Colo.
THERMAL STRATIFICATION IN DIRECT GAIN PASSIVE HEATING SYSTEMS WITH VARIABLE HEATING OF THE FLOOR AND ONE VERTICAL WALL
R. S. Anderson, E. M. Fisher, and M. S. Bohn Sep. 1985 8 p Presented at the SOLAR 1985, Raleigh, N.C., 15 Oct. 1985
(Contract DE-AC02-83CH-10093)
(DE85-016860; SERI/TP-252-2767; CONF-851030-6) Avail: NTIS HC A02/MF A01

This paper reports the results of an experimental study that used a 1/4-scale, water-filled test cell to examine the effect of the natural convection flows created by horizontal and vertical heated surfaces upon thermal stratification in a single-zone enclosure. The study covered the range from pure floor heating to pure wall heating, including various levels of combined floor and wall heating. The presence of a cold window or thermal storage surface was simulated by cooling the wall directly opposite the heated vertical wall. Flow visualization studies were carried out to determine the structure of the flow in the test cell. Correlations are reported for heat transfer, temperature distributions, and thermal stratification as a function of the relative amount of heating that was provided to the floor and wall of the test cell. The results of the study can be used to predict the flow patterns, energy transfer, and levels of thermal stratification that occur in direct gain solar systems that are dominated by natural convection. DOE

N86-17678# Florence Univ. (Italy). Ist. di Energetica.
QUASI THREE-DIMENSIONAL FINITE ELEMENT FLOW CALCULATION IN PUMPS
E. Carnevale, S. Giusti, G. Manfrida, and F. Martelli 1985 10 p refs Presented at 7th Scientific Society of Mechanical Engineers Conference on Fluid Machinery, Budapest, Hungary, 1983
Avail: NTIS HC A02/MF A01

Computer codes to solve meridional and blade-to-blade two-dimensional inviscid flow on turbomachine blades were developed. The codes interact between themselves to give a quasi three-dimensional picture of the flow. The codes are validated by checking predictions against experimental data on a centrifugal impeller. Author (ESA)

N86-17679# Florence Univ. (Italy). Ist. di Energetica
FLOW CALCULATION IN PUMP IMPELLERS BY FINITE ELEMENTS
F. Martelli and G. Manfrida 1985 11 p refs Presented at 7th Scientific Society of Mechanical Engineers Conference on Machinery, Budapest, Hungary, 1983
Avail: NTIS HC A02/MF A01

A finite element discretization and a formulation of the flow equations in the meridional-tangential abscissae domain were implemented to overcome the intrinsic nonlinearity of the flow equations on nonaxial turbine geometries and to deal with periodic boundaries ahead and after the blade. This enables a coupling of two-dimensional calculations of meridional flow surfaces with calculations of blade-to-blade surfaces to provide a quasi three dimensional image of the flow in turbomachines. Geometries from axial to centrifugal can be analyzed without discontinuities. A trailing edge closure analysis technique is used to predict impeller discharge angle. Author (ESA)

N86-17680# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
INVESTIGATION OF AN OBLIQUE SHOCK WAVE/LAMINAR BOUNDARY LAYER INTERACTION USING LASER DOPPLER VELOCIMETRY (LDV)
C. H. Boccadoro and J. F. Wendt Jun. 1984 64 p refs
(Grant AFOSR-83-0273)
(VKI-TN-152) Avail: NTIS HC A04/MF A01

The wholly laminar boundary layer separation associated with an incident shock wave was studied in a wind tunnel at Mach 2.20. Mean velocity profiles in and around the separation are measured using a laser Doppler velocimeter with Bragg cell. Reversed flow velocities of up to 4.2% of free stream and measurements to within 0.1 mm from the surface are obtained. Linear extrapolations of the zero-line velocities coincide with separation and reattachment points estimated from shadowgraph visualization. The measured flow field is shown to be free of large finite end effects by assessing model surface pressures with and without side plates installed. A limiting two-dimensional pressure distribution on center line is observed only when the distances between side plates exceeds more than twice that observed in comparable compression corner experiments. Velocity and surface pressure data compare very favorably with computational results obtained from a full two-dimensional Navier-Stokes code and with other experimental results. Author (ESA)

N86-17681# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
A TWO-DIMENSIONAL MODEL FOR BOILING IN AN ACTIVE

PARTICLE BED: BOIL
P.-H. Theunissen and J.-M. Buchlin Oct. 1984 39 p refs
(VKI-TN-153) Avail: NTIS HC A03/MF A01

In order to model two-dimensional boiling in an active particle bed, a two dimensional, steady state, isothermal model was assembled, starting from the mass, momentum, and energy conservation laws. The momentum balance includes capillary and gravity effects and two phase flow pressure losses. This physical description is translated into a mathematical model and implemented as a numerical code, BOIL, using an optimized numerical solving process. One and two-dimensional test cases are run to emphasize the effects of boundary conditions; heat source distribution; relative permeability laws; and Leverett function coefficient. Results allow a good level of confidence in BOIL. Two-dimensional effects of capillary forces are discussed.
Author (ESA)

N86-17682# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
AN IMPROVED PRESSURE ITERATION PROCEDURE FOR THE SOLA ALGORITHM APPLIED TO THE SOLUTION OF THE INCOMPRESSIBLE NAVIER-STOKES EQUATIONS
H. Andersson and C. Benocci Oct. 1984 53 p refs Sponsored by Royal Norwegian Council for Scientific and Industrial Research and Von Karman Institute for Fluid Dynamics
(VKI-TM-35) Avail: NTIS HC A04/MF A01

The SOLA solver for the incompressible Navier-Stokes equations was analyzed to assess its application to the subgrid modeling of turbulent flows. A possible source of inaccuracies in the iterative procedure for the determination of pressure is identified, and eliminated with a simple modification. Author (ESA)

N86-17683# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
UNSTEADY THREE-DIMENSIONAL SURFACE THEORY WITH THE FREE SURFACE EFFECT: SUPERCRITICAL CASE
Jacques Leclerc and Pierre Salauen 1984 207 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-933)
(ONERA-P-1984-1; ISSN-0078-379X) Avail: NTIS HC A10/MF A01

The unsteady linearized theory in the supercritical case is solved by the integral equation method. The Kernel originating in the potential of the Havelock source is expressed as a Fourier series with respect to the azimuth angle, the coefficients of which are simple integrals. It is shown that convergence disappears on the free-surface downstream, behind the integration point. An asymptotic approximation of the remainder is given. This provides a way of finding the singularity. The integral equation yielding the local lift coefficient is solved by a collocation method similar to that of Multhopp. Numerical results of horizontal and vertical vibrating plates moving horizontally are given. Author (ESA)

N86-17684# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
THE STEADY LIFTING SURFACE THEORY WITH A FREE-SURFACE
Jacques Leclerc and Pierre Salauen 1984 38 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-934)
(ONERA-P-1984-2; ISSN-0078-379X) Avail: NTIS HC A03/MF A01

A method to solve the unsteady lifting surface problem is applied to steady surfaces with a free-surface. The local lifting coefficient appears as a solution to an integral equation of the first kind whose kernel, deduced from the Havelock source potential, is expanded in a Fourier series, with respect to the azimuth angle. Numerical applications such as the calculation of the lift and drag of a lifting wing, and hydrodynamic pressures in the case of turn of a ship are given. Author (ESA)

N86-17685# Southampton Univ. (England). Inst. of Sound and Vibration Research.
[ACTIVITIES REPORT OF THE INSTITUTE OF SOUND AND VIBRATION RESEARCH] Annual Report, Mar. 1985
1985 46 p refs
Avail: NTIS HC A03/MF A01

Research in fluid dynamics and acoustics (noise and vibration control); audiology and human effects (audiotory communication and hearing conservation); structures and machinery (automotive design); and shock analysis is summarized. Underwater acoustics; active noise control; aircraft noise; wind turbine noise; laminar flow fans; helmet design; and the acoustics of flow ducts were studied. Author (ESA)

N86-17686# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
PROGRESS IN THE DEVELOPMENT OF A TWO-FLUID MODEL OF TURBULENCE FOR NEAR-WALL FLOWS. PART 2: HEAT-TRANSFER CHARACTERISTICS OF A BOUNDARY LAYER
J. O. Ilegbusi Sep. 1984 25 p refs
(CFD/84/8-Pt-2) Avail: NTIS HC A02/MF A01

Heat transfer rates, velocity profiles, and temperature distributions for the turbulent incompressible flow of air over an isothermal flat plate were predicted with a two fluid model of turbulence. The constant expressing the conduction of heat between the two fluids is optimized with reference to mean flow data. This constant is employed with those established in an investigation of the hydrodynamics. Predictions compare well with experimental data, but the Stanton number is unpredicted along the plate, implying that the wall boundary condition should be improved.Author (ESA)

N86-17687*# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
TWO-FLUID MODELS OF TURBULENCE
D. Brian Spalding Apr. 1985 27 p refs Presented at NASA Langley Workshop on Theoretical Approaches to Turbulence, Hampton, Va., 10-12 Oct. 1984 Sponsored by NASA, UK Science and Engineering Research Council, UK Health and Safety Executive, US Army (European Office), UK Atomic Weapons Research Establishment and UKAEA
(NASA-CR-176419; NAS 1.26:176419; CFD/85/4) Avail: NTIS HC A03/MF A01

The defects of turbulence models are summarized and the importance of so-called nongradient diffusion in turbulent fluxes is discussed. The mathematical theory of the flow of two interpenetrating continua is reviewed, and the mathematical formulation of the two fluid model is outlined. Results from plane wake, axisymmetric jet, and combustion studies are shown. Author (ESA)

N86-17688# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
THE NUMERICAL CALCULATION OF PARTICLE-SIZE DISTRIBUTIONS IN 2D JETS AND BOUNDARY LAYERS
D. Brian Spalding Apr. 1985 39 p refs Previously announced as BL/TN/A/35
(CFD/85/6; BL/TN/A/35) Avail: NTIS HC A03/MF A01

The Parmix program for calculating particle size distributions in 2D jets and boundary layers is presented. Parmix is a development of Genmix 4, which allows the fuel to be supplied as a suspension of condensed phase particles in a gaseous stream. The particles are allowed to vary in size, by membership of one of five differently sized groups of particles. Larger sized particles move into the smaller sized groups as a result of vaporization or direct oxidation. The concentration of particles within each particle size group appears as a distinct variable of a differential equation.
Author (ESA)

N86-17689# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
LAMINAR FLOW IN A DRIVEN SQUARE CAVITY
Liu Jun and D. Brian Spalding, ed. Nov. 1984 30 p refs
(PDR/CFDU/IC/17) Avail: NTIS HC A03/MF A01

The PHOENICS code was employed to compute the steady two-dimensional viscous incompressible flow generated within a square cavity by a moving surface at the cavity open end. Results

with Reynolds numbers of 100 and 1000 are compared with published solutions. The comparisons demonstrate that close agreement for velocities and pressures is obtained. Author (ESA)

N86-17690# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
ONE-DIMENSIONAL PREDICTION OF THE INTERFACE MOTION SEPARATING TWO IMMISCIBLE FLUIDS ENCLOSED IN A LONG DUCT
F. R. Villasenor and D. Brian Spalding, ed. Oct. 1984 56 p refs (PDR/CFDU/IC/19) Avail: NTIS HC A04/MF A01

The numerical prediction for the time dependent interface location between two immiscible fluids is presented. The fluids have a small density difference and are contained in a closed duct of square cross section. The process starts when the duct, which is at first either horizontal or vertical, and at rest, is suddenly tilted. The problem is simulated by a one-dimensional, unsteady and laminar two phase model. The results are plausible and comparison with a simplified analytical solution is presented. Agreement is very good. Author (ESA)

N86-17691# Centre Technique des Industries Mecaniques, Senlis (France).
LIQUID FLOW CALIBRATION Final Report [ETALONNAGE DEBIMETRE POUR LIQUIDES]
J. P. Lecerf and P. Meurice 16 May 1984 52 p In FRENCH (CETIM-15-C-251) Avail: NTIS HC A04/MF A01

A flow calibrating method is proposed. The flowmeter is placed in a flow controlled hydraulic flow, and the time necessary to displace a hydraulic piston between electronically controlled positions is measured. The electronic measurement allows for an easy automation. The accuracy of the calibration is $> 0.05\%$ for flows between 0.1 and 600 lt/min. Author (ESA)

N86-17692# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Energetique.
MODELS AND PREDICTION OF TURBULENT FLOW WITH PARTICLES [MODELISATION ET PREDICTION D'ECOULEMENTS TURBULENTS AVEC PARTICULES]
Roland Borghi 29 Nov. 1984 61 p refs In FRENCH (Contract DRET-83-34-134)
(ONERA-RTS-21/7135-EY) Avail: NTIS HC A04/MF A01

The diffusion of a particle cloud in a turbulent flow is studied in order to compare theory and experiment, to evaluate the influence of the particles in a fluid field, and to develop a computation of recycled flow. It is shown that two computation procedures are operational. The superdispersion of large particles is confusing. The Kolmogorov scale, turbulence anisotropy, and the influence of the particles on the turbulence are discussed. Author (ESA)

N86-17693# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Div. d'Aerodynamique Theorique.
COMPUTATION OF VISCOUS COMPRESSIBLE FLOW IN A TURBOMACHINE BLADE ARRAY Final Report [CALCUL D'ECOULEMENTS COMPRESSIBLES VISQUEUX DANS LES GRILLES D'AUBES]
L. Cambier Jan. 1985 53 p refs In FRENCH (Contract DRET-84-34-001)
(ONERA-RSF-27/7077-AY-408) Avail: NTIS HC A04/MF A01

A computer program for flow calculation in turbomachines was modified. The modular structure allows a partial computation. The program can deal with turbulence models. It was verified by computation of the shock wave/boundary layer interactions. The application to large Reynolds transonic flow in blade array with a treatment of the viscous wake, is outlined. Author (ESA)

N86-17694# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorbauelemente.
TEST OF A MEASURING INSTRUMENT COMPOSED OF TWO LOCAL FLOW TURBINES, TWO DRAG BODIES, A FULL FLOW TURBINE AND A TWO-BEAM DENSITOMETER, OF THE LARGE PRESSURIZED WATER REACTOR OFFNORMAL BEHAVIOR INVESTIGATION (LOBI) INSTRUMENTATION IN A TRANSIENT TWO-PHASE FLOW
H. John (Forshungsanstalt Ispra, Italy), E. Ohlmer (Forschungsanstalt Ispra, Italy), W. Schutze (Forschungsanstalt Ispra, Italy), G. Weste, J. Reimann, and G. Eisele Jun. 1985 86 p refs In GERMAN; ENGLISH summary
(KfK-3877; EUR-9607-D; ISSN-0303-4003) Avail: NTIS HC A05/MF A01

A test section in the Large PWR Offnormal Behavior Investigations test instrumentation equipped with two local flow turbines, a two-beam gamma densitometer, two drag bodies, and a full flow turbine was tested for mass flow recording accuracy and for reliability in a test loop for unsteady two phase measuring method with a transient steam water flow (blowdown). Calculation of the mass flow from measurement signals and comparison of the results with the reference instrumentation measurements are presented. Refinement of the calculation models and improvement of the measuring accuracy and reliability of each instrument are recommended. Author (ESA)

N86-17695# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
LIMITATIONS IN VARIABLE CONDUCTANCE HEAT PIPE PERFORMANCE AND CONTROL PREDICTED BY THE CURRENT STEADY-STATE MODEL DEVELOPED AT NLR
A. A. M. Delil 23 Jan. 1984 12 p refs Presented at International Heat Pipe Conference, Tsukuba, Japan, 14-18 May 1984 (Contract NIVR-1833)
(NLR-MP-84009-U; B8568087) Avail: NTIS HC A02/MF A01

A uniaxial model for the transient performance of gas-loaded variable conductance heat pipes is discussed. The model has to be easily implementable in existing spacecraft thermal analyzer computer programs. A steady-state version of the model is available. It accounts for diffusion at the vapor/gas front (shown to be negligible), radial conduction in the wall and wick, and inertia and friction of the moving vapor. A parameter study was carried out to design a heat pipe and to define test conditions for the experimental verification of the model. Results illustrate that inertia and friction can induce considerable limitations in performance and control. Author (ESA)

N86-17696# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
MULTIGRID SOLUTION OF THE STEADY EULER EQUATIONS
P. W. Hemker and S. P. Spekreijse May 1985 16 p refs
(CWI-NM-R8505; B8567081) Avail: NTIS HC A02/MF A01

A multigrid (MG) method for the approximation of steady solutions to the full two-dimensional Euler equations is described. The space discretization is obtained by the finite volume technique and Osher's approximate Riemann-solver. Symmetric Gauss-Seidel relaxation is applied to solve the nonlinear discrete system of equations. A multigrid method, the full approximation scheme, accelerates this iterative process. In two-dimensional test problems, (subsonic, transonic and supersonic) the multigrid iteration is applied to an initial estimate obtained by the FMG-technique (nested iteration). For the discretization on the different levels, a fully consistent sequence of nested discretizations is used. The prolongations and restrictions selected agree with this consistency. It turns out that the total amount of work required to obtain a solution that is accurate up to truncation error, corresponds to a small number of nonlinear Gauss-Seidel iterations. In transonic flow the rate of convergence of the MG-iteration appears independent of the number of cells in the discretization. Author (ESA)

N86-17697# Maritiem Research Inst. Nederland, Wageningen.
NUMERICAL SIMULATION OF FLOW AROUND CIRCULAR CYLINDERS AT HIGH REYNOLDS NUMBERS
J. J. W. vanderVegt and W. C. deBoom Jan. 1985 13 p refs (Z-50551; BOSS-1985) Avail: NTIS HC A02/MF A01

A numerical method to determine drag and lift forces on circular cylinders by modeling the unsteady flow field characterized by vortex shedding is presented. The computations are compared

with experimental data obtained from a verification test program. Comparison for a steady incoming flow at Reynolds number 32,000 shows that the method provides a good representation of the flow field, predicts the frequency of vortex shedding accurately, and yields reasonable predictions of the drag and lift force time histories. The method is also applicable for flow at high Reynolds numbers as long as the flow remains two-dimensional. The drag and lift force time histories show large variations throughout a test or between experiments. The magnitude of the drag force coefficient appears to be related to the envelope of the lift force. Relatively high drag forces are coupled with series of large lift force amplitudes. Author (ESA)

N86-17698# Technical Research Centre of Finland, Espoo. Nuclear Engineering Lab.
SIMULATION OF FLAME ACCELERATION IN UNCONFINED VAPOR CLOUD EXPLOSIONS
Lars Kjaeldman and Risto Huhtanen Aug. 1985 56 p refs
(VTT-RR-357; ISBN-951-38-2384-9; ISSN-0358-5077) Avail: NTIS HC A04/MF A01; Technical Research Centre of Finland, Espoo FIM 42

The feasibility of numerical simulation in accident and safety analysis of unconfined vapor cloud explosions, and simulation of flame acceleration phenomenon from published data of experiments were studied. Two explosion experiments were simulated with the PHOENICS-code. The flame acceleration, mainly due to the enhanced combustion from turbulence generation at obstacles in the flow regime, can be simulated. The computation gives correct order of magnitude for the maximum overpressure in both explosions, of which one was weak and the other strong. The differences between the computed results and experiments are discussed and suggestions on how to improve the simulation model are given. More simulations of explosions and detailed experimental information of the initial conditions and development of the explosions are needed before simulations can reliably be used in accident and safety analysis. Author (ESA)

N86-17699# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
A SURVEY OF NUMERICAL METHODS FOR THE CALCULATION OF INVISCID, POSSIBLY ROTATIONAL EULER FLOWS AROUND AERONAUTICAL CONFIGURATIONS
J. W. Boerstoel 11 Oct. 1983 20 p refs
(NLR-TR-83130-U; B8568392) Avail: NTIS HC A02/MF A01

Numerical methods for the calculation of inviscid Euler flows are reviewed. For aerodynamic applications, the existing methods are accurate and cheap enough. However, shocks and vortex sheets may have to be better modeled to achieve higher numerical accuracy. Computation times can be reduced by applying multigrid methods. Author (ESA)

N86-17700# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
BOUNDARY LAYER CALCULATIONS ON THE LEEWARD SURFACE OF A SLENDER DELTA WING AT INCIDENCE
A. C. deBruin 22 Dec. 1983 41 p refs
(NLR-TR-84001-U; B8569025) Avail: NTIS HC A03/MF A01

A 3D-boundary layer calculation method was used to predict the location of the secondary boundary layer separation on the leeward surface of a slender delta wing at incidence for fully laminar flow and forced boundary layer transition at the 50% semispan location. The behavior of the predicted boundary layer properties is qualitatively in good agreement with the experiment. A difference between the potential flow and experimental pressure distribution causes a discrepancy between the predicted and the experimentally observed location of secondary separation. It is expected that the potential flow pressure distribution can be improved when the leading edge and the secondary separation vortex sheet are correctly modeled in the potential flow calculation method. It is concluded that boundary layer calculations can provide valuable information for the location of the secondary separation line, to model the associated vortex sheet. Author (ESA)

N86-17274# Kyoto Univ. (Japan). Dept. of Aeronautics.
FLOWS OF GAS-PARTICLE MIXTURES WITH SIZE-DISTRIBUTION
Ryuji Ishii *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 53-58 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17275# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT OF COMPUTATIONAL FLUID DYNAMICS AT NASA AMES RESEARCH CENTER
Mamoru Inouye *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 56-66 refs Previously announced in N85-12866 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17277# Ship Research Inst., Tokyo (Japan).
COMPUTATION OF THE TWO-DIMENSINAL INCOMPRESSIBLE NAVIER-STOKES EQUATIONS USING AN IMPLICIT FACTORED METHOD
Yoshiaki Kodama *In* National Aerospace Lab. Proceedings of the 2nd NAL Computational Aerodynamics 1984 p 77-84 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17280# National Aerospace Lab., Tokyo (Japan).
FULLY-THREE DIMENSIONAL FLOW FIELD ANALYSIS THROUGH TURBINE STATES: APPLICATIONS OF TIME MARCHING METHOD
Tatsuo Araki, Atsuhide Suzuki, and Tadashi Kobayashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 101-108 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17281# National Aerospace Lab., Tokyo (Japan).
NUMERICAL FLOW ANALYSIS FOR AXIAL FLOW TURBINE
Tomohiko Sato and Sunao Aoki *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 109-118 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17296# Kawasaki Heavy Industries, Ltd., Akashi (Japan).
THE ROLE OF COMPUTATIONAL FLUID DYNAMICS IN AERONAUTICAL ENGINEERING
Takashi Uchida, Tadamasa Jyonouchi, Keisuke Sawada, and Tohru Nohisa *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 255-270 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
(Rept-2) Avail: NTIS HC A14/MF A01

N86-17902# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: FACILITIES AND TECHNIQUES
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 49 p (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17903# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: HISTORICAL NOTES
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 13 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-17701 National Physical Lab., Teddington (England). Div. of Quantum Metrology.
TEMPERATURE FIXED POINTS. 1: POSSIBLE DEVICES IN THE RANGE 0 TO 125 C
M. F. Vaughan Feb. 1985 32 p refs
(NPL-QU-70; ISSN-0309-3050) Copyright. Avail: Issuing Activity

The need for temperature fixed points in the temperature range 0 to 125 C for the calibration and calibration-checking of electronic thermometers based on thermistors, and small platinum resistance thermometers is shown. Metal, melting and freezing, cell, and organic compound triple-point cell devices are considered. The realization and maintenance of the fixed points are discussed to assess their use in the laboratory and the possibilities of operating the devices automatically. It is concluded that while metal cells may be easier to operate automatically, organic triple-point cells are easier to use in the laboratory and can be maintained for longer periods. While only one or two metals seem likely candidates for fixed points in the range considered, there is a very large number of possible organic compounds available.
Author (ESA)

N86-17702 Royal Aircraft Establishment, Farnborough (England).
A SMOKE GENERATOR FOR THE ABSOLUTE CALIBRATION OF GAS TURBINE ENGINE SMOKE SAMPLING AND MEASURING SYSTEMS
S. P. Girling and C. D. Hurley Jan. 1985 27 p refs
(RAE-TM-P-1044; BR95024) Avail: NTIS HC A03/MF A01

A smoke generator capable of producing a stable source of smoke over a prolonged period by pyrolysis of aviation kerosene was developed. The smoke levels and characteristics are representative of aircraft engine smoke. The smoke generator provides a means of assessing and calibrating smoke sampling and measurement systems. Accurate gravimetric calibration of SAE smoke number against carbon loading is described. Author (ESA)

N86-17703*# Desert Research Inst., Reno, Nev. Atmospheric Sciences Center.
EVALUATION OF DATA OBTAINED FROM ATMOSPHERIC LASER DOPPLER VELOCIMETER Final Report
Thomas S. Keck and James W. Telford 20 Jun. 1985 24 p
(Contract NAS8-34731)
(NASA-CR-178474; NAS 1.26:178474) Avail: NTIS HC A02/MF A01 CSCL 14B

The Doppler lidar velocimeter produces a variety of kinds of data. Besides the line of sight velocity components, there are the reflected amplitudes and the Doppler widths. Computer graphics software for displaying these data was produced. Different methods of presentation are needed for the various items. A picture was produced as pictures are often the best way to gain understanding. The individual lidar scans form a crosshatch pattern. Thus one-dimensional measurements fit together to form a two-dimensional whole. A pair of velocity measurements at a point combine to form a wind measurement with direction and magnitude. This gives a forest of wind vectors. The goal is to find a recognizable pattern to these trees. Often it is necessary to show only part of the information. That is, show only the wind direction not its magnitude or reduce the wind to streamlines of air flow. In other cases data are reduced to contour plots. Just enough contour lines are included to show the picture described. Author

N86-17704# Naval Submarine Medical Research Lab., Groton, Conn.
PROPOSED TRANSFER-FUNCTION TECHNIQUE FOR EARPHONE ANALYSIS Interim Report
J. S. Russotti, T. Santoro, G. B. Haskell, and R. Neal 20 Jun. 1985 19 p
(M09-33)
(AD-A160054; NSMRL-1052) Avail: NTIS HC A02/MF A01 CSCL 17/1

This research was prompted by the need to select a suitable headset for auditory processing of passive-sonar information. The selection of an accurate transducer for auditory processing of passive sonar signals requires accurate measurement of frequency response. No standard for such measurement exists. The method proposed here uses a modified Zwislocki acoustic coupler mounted in an anthropometrically and acoustically average mannikin, KEMAR, in order to simulate the acoustic load that an average human ear would place on the earphone element. A computerized signal-collection and -analysis system substracted this transfer function from stored earphone-response data. Responses were averaged across samples of left and right earphone elements and across repeated measurements that sampled variability due to headset placement, seal around the ear, and headband tension. Analog plots of earphone frequency response were indistinguishable from computer regenerated plots of that same frequency response. Comparison of raw data and corrected data show the correction procedure to be within 0.2 dB of perfect accuracy. GRA

N86-17705# Essex Corp., Orlando, Fla.
PLAN FOR EVALUATION OF THE TRAINING POTENTIAL OF HELMET-MOUNTED DISPLAY AND COMPUTER-GENERATED SYNTHETIC IMAGERY Final Report, Jan. 1981 - Apr. 1985
K. S. Berbaum and R. S. Kennedy 29 Apr. 1985 59 p
(Contract N61339-81-C-0105)
(AD-A160299; EOTR-85-6) Avail: NTIS HC A04/MF A01 CSCL 05/9

This report describes a plan of empirical research to evaluate the training effectiveness of a helmet-mounted display (HMD), and of computer-generated synthetic imagery (CGSI), for low level flight, navigation, and target interaction. This HMD has been developed by the Advanced Simulation Concepts Laboratory of the Naval Training Equipment Center for use in the Navy Visual Technology Research Simulator (VTRS). Optics mounted on the pilots's helmet project a scene upon a retro-reflecting screen. Two computer-image generation (CIG) channels are incorporated which present a wide-angle, low-resolution, low-detail background and an area of interest (AOI) of high resolution and detail. Eye and head tracking are used to position the display so that the AOI is presented to the fovea. The goal of HMD is to present a scene to the pilot that is indistinguishable from the real world insofar as pilot performance is concerned. The evaluation plan describes training scenarios emphasizing low level flight and ground interaction, response parameters used in measuring pilot performance, psychological experiments comparing the training efficacy of various aspects of HMD and CGSI, post stimulation subjective measures of pilot comfort, and the logistics of the research plan itself. GRA

N86-17706# Lawrence Livermore National Lab., Calif.
RESULTS OF PRIM GYROSCOPE TESTING: CONCLUSIONS REGARDING PRIM EFFECTS, SUPPLEMENT 1
R. H. Cornell Mar. 1985 2 p Presented at the 17th Ballistics Working Group Meeting, Livermore, Calif., 17 Oct. 1984
(Contract W-7405-eng-48)
(DE85-012933; UCRL-92356-Suppl-1) Avail: NTIS HC A02/MF A01

The effects of a Partially Restrained Internal Member in the XM785 projectile were determined. Small effects were observed during the small PRIM gyroscopic tests and of flight disturbances that are absent during the JB' tests. E.A.K.

N86-17707# Lawrence Livermore National Lab., Calif.
COUPLING BETWEEN PLASTIC SCINTILLATORS AND LIGHT FIBERS FOR REMOTE DETECTION OF X-RAYS
T. S. Perry and J. J. Molitoris 18 Jul. 1985 6 p refs Presented

at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-48)
(DE85-016946; UCRL-92198; CONF-850887-20) Avail: NTIS HC A02/MF A01

Plastic scintillators can be coupled to light fibers to make small, simple, and inexpensive X-ray detectors. These detectors have been developed for use at the Nevada Test Site (NTS) for the remote detection of X-rays. Light produced in the scintillator can be transmitted by the fiber for several hundred meters to a photodetector, which is usually a streak camera or a photomultiplier tube. The use of a streak camera allows many channels to be recorded simultaneously. A parameter study has been done to measure the sensitivity of these detectors as a function of scintillator geometry, type of scintillator, coupling geometry, and X-ray energy. The results can be qualitatively explained by simple geometric theory. A recent use of these detectors at NTS was the measurement of an X-ray spectrum. System performance for this measurement will be reviewed. DOE

N86-17708# Department of Energy, Washington, D. C.
GATED STRIP PROPORTIONAL DETECTOR Patent Application
C. L. Morris (Los Alamos National Lab., N. Mex.), G. C. Idzorek (Los Alamos National Lab., N. Mex.), and L. G. Atencio, inventors (to DOE) (Los Alamos National Lab., N. Mex.) Filed 19 Feb. 1985 24 p
(Contract W-7405-eng-36)
(DE85-017757; US-Patent-Appl-SN-702751) Avail: NTIS HC A02/MF A01

A gated strip proportional detector includes a gas tight chamber which encloses a solid ground plane, a wire anode plane, a wire gating plane, and a multiconductor cathode plane. The anode plane amplifies the amount of charge deposited in the chamber by a factor of up to 10 to the 6th power. The gating plane allows only charge within a narrow strip to reach the cathode. The cathode plane collects the charge allowed to pass through the gating plane on a set of conductors perpendicular to the open-gated region. By scanning the open-gated region across the chamber and reading out the charge collected on the cathode conductors after a suitable integration time for each location of the gate, a two-dimensional image of the intensity of the ionizing radiation incident on the detector can be made. DOE

N86-17709# Department of Energy, Washington, D. C.
RECIRCULATING CROSS-CORRELATION DETECTOR Patent Application
W. H. Andrews, Jr. and M. J. Roberts, inventors (to DOE) Filed 18 Jan. 1985 14 p
(Contract DE-AC05-84OR-21400)
(DE85-017782; US-Patent-Appl-SN-692748) Avail: NTIS HC A02/MF A01

A digital cross-correlation detector is provided in which two time-varying signals are correlated by repetitively comparing data samples stored in digital form to detect correlation between the two signals. The signals are sampled at a selected rate converted to digital form, and stored in separate locations in separate memories. When the memories are filled, the data samples from each memory are first fed word-by-word through a multiplier and summing circuit and each result is compared to the last in a peak memory circuit and if larger than the last is retained in the peak memory. Then the address line to leading signal memory is offset by one byte to affect one sample period delay of a known amount in that memory and the data in the two memories are then multiplied word-by-word once again and summed. If a new result is larger than a former sum, it is saved in the peak memory together with the time delay. The recirculating process continues with the address of the one memory being offset one additional byte each cycle until the address is shifted through the length of the memory. The correlation between the two signals is indicated by the peak signal stored in the peak memory together with the delay time at which the peak occurred. The circuit is faster and considerably less expensive than comparable accuracy correlation detectors. DOE

N86-17710# Department of Energy, Washington, D. C.
IMPROVED FIBEROPTIC SPECTROPHOTOMETER Patent Application
P. P. Tans and D. A. Lashof, inventors (to DOE) Filed 2 Apr. 1985 22 p Prepared in cooperation with California Univ., Berkeley, Lawrence Berkeley Lab.
(Contract DE-AC03-76SF-00098)
(DE85-017792; US-Patent-Appl-SN-697824) Avail: NTIS HC A02/MF A01

The present invention allows for accurate spectrophotometric comparison of the Raman scattering from a sample gas with the Raman scattering from a known gas via a novel fiber optic network. The need for complicated electronic of optical circuit balancing, control, or error compensation circuitry is eliminated. The laser cavity is split into two regions, one of which houses the plasma discharge and produces laser power, and the other of which is adapted to house tubes containing the gas samples. Light from the laser source is beamed simultaneously through samples of the reference gas and the unknown gas, and Raman-scattered light is emitted. The Raman-scattered light from the known and unknown mixtures is then alternately passed through a fiber optic network where the various wavelengths are spatially mixed. The mixed light is then passed into a system of light detectors, each of which is adapted to measure one of the wavelengths of light representing a constituent element of the gases. When the test is complete, each gas sample can be assigned a Raman-scattered profile from the data consisting of the ratios each of the constituent elements bear to each other. DOE

N86-17711# Department of Energy, Washington, D. C.
MICROWAVE DETECTOR Patent Application
H. W. Meldner, R. Y. Cusson, and R. M. Johnson, inventors (to DOE) Filed Feb. 1985 17 p Prepared in cooperation with LLNL
(Contract W-7405-eng-48)
(DE85-017797; US-Patent-Appl-SN-699879) Avail: NTIS HC A02/MF A01

A microwave detector is provided for measuring the envelope shape of a microwave pulse comprised of high-frequency oscillations. A biased ferrite produces a magnetization field flux that links a B-dot loop. The magnetic field of the microwave pulse participates in the formation of the magnetization field flux. High-frequency insensitive means are provided for measuring electric voltage or current induced in the B-dot loop. The recorded output of the detector is proportional to the time derivative of the square of the envelope shape of the microwave pulse. DOE

N86-17712# Brookhaven National Lab., Upton, N. Y.
PRECISION CRYOGENIC TEMPERATURE DATA ACQUISITION SYSTEM
Y. Farah and J. H. Sondericker 1985 7 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017847; BNL-36969; CONF-850814-7) Avail: NTIS HC A02/MF A01

A Multiplexed Temperature Data Acquisition System with an overall precision of + or - 25 ppM has been designed using state-of-the-art electronics to accurately read temperature between 2.4 K and 600 K from pre-calibrated transducers such as germanium, silicon diode, thermistor or platinum temperature sensors. DOE

N86-17713# Los Alamos National Lab., N. Mex.
POSITION SENSITIVE GAS COUNTER READOUT SYSTEM
J. S. Kapustinsky, W. E. Sondheim, K. D. Bol, M. R. Clover, R. M. DeVries, N. J. DiGiacomo, and J. W. Sunier Aug. 1985 7 p refs
(Contract W-7405-eng-36)
(DE85-017953; LA-10494-MS) Avail: NTIS HC A02/MF A01

A position sensitive detector was designed for intermediate energy physics experiments covering a broad range of ejectiles from minimum ionizing pions through low energy protons and deuterons. Each detector provides two planes of both X and Y position information. This paper focuses on the Y system, an

individual anode wire readout design that amplifies and discriminates anode signals at the spectrometer, and then transmits the logic signals to a data acquisition trailer. The steps we took to insure reliable operation of the system are described. In addition to position identification, on-line displays of the data received from the anode wire readout system provide powerful diagnostic tools for determining the source location of detected events and the beam position relative to the spectrometer target. A routing unit, designed to allow the measurement of the X,Y coordinates of two particles hitting the detector simultaneously is also described.DOE

N86-17714# Brookhaven National Lab., Upton, N. Y.
HIGH FLUX PHOTON BEAM MONITOR
P. Mortazavi, M. Woodle, H. Rarback, D. Shu, and M. Howells 1985 16 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985 Prepared in cooperation with California Univ., Berkeley. Lawrence Berkeley Lab.
(Contract DE-AC02-76CH-00016)
(DE85-018202; BNL-36903; CONF-850734-2) Avail: NTIS HC A02/MF A01

We have designed two photon beam position monitors for use on our X-ray storage ring beam lines. In both designs, a pair of tungsten blades, separated by a pre-determined gap, intercepts a small fraction of the incoming beam. Due to photoemission, an electrical signal is generated which is proportional to the amount of beam intercepted. The thermal load deposited in the blade is transferred by a heat pipe to a heat exchanger outside the vacuum chamber. A prototype monitor with gap adjustment capability was fabricated and tested at a UV beam line. The results show that the generated electrical signal is a good measurement of the photon beam position. In the following sections, design features and test results are discussed. DOE

N86-17715# Argonne National Lab., Ill.
MUPPATS: A MULTIPARTICLE 3D IMAGING DETECTOR SYSTEM
A. Faibis, W. Koenig, E. P. Kanter, and Z. Vager 27 Aug. 1985 18 p Presented at the 11th International Conference on Atomic Collisions in Solids, Washington, D.C., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018451; CONF-850813-4) Avail: NTIS HC A02/MF A01

It has long been recognized that the foil-induced dissociation of fast molecular ions is a potentially powerful method to determine the stereochemical structures of the molecular projectiles. We have recently developed a detector system specifically designed for such experiments. The MUPPATS detector is a large-area multistep low pressure gas counter. The requirements of multiparticle detection with good position and time resolution leads to a rather complex data-readout and reduction scheme. The system relies on several state-of-the-art techniques, developed in high-energy physics during recent years, to dramatically reduce the cost of the MUPPATS detector. Preliminary results for several polyatomic molecular ions have already been obtained. Some new avenues of research opened up by this detector are also described. DOE

N86-17716# Dynaflow Software Systems B.V., Amsterdam (Netherlands).
SOFTWARE QUALITY METRICS OF THE FAINT OBJECT CAMERA (FOC) IMAGE PROCESSING SOFTWARE Final Report
J. Gras and I. Hamburg-Everts (Infonet Automation Services b.v.) Paris ESA 30 Jun. 1984 68 p Sponsored by Infonet Automation Services b.v.
(Contract ESA-4618/81/NL-PP)
(ESA-CR(P)-2039) Avail: NTIS HC A04/MF A01

The utility of software error counts and complexity measures in developing image processing software was assessed. The Rayleigh curve can be used as a predictor if the two parameters k, a, are known, but using a Rayleigh curve fit to data points at various stages of the Faint Object Camera image processing system project would have led to inaccurate predictions. Walston/Felix relations give simple global measures of a product which might prove useful as quality indicators. There is no evidence that complexity density can predict trouble spots in the code or detect problems associated with poor design decisions. The practical value of these metrics is limited and there appears to be no justification for stipulating maximum values of these metrics for a single module. Reliability models show promise for determining when a software system is sufficiently tested to allow release to the field. However, their use implies a test situation which emulates the situation in the field faithfully and may require a long (and expensive) test period. The models investigated appear low in predictive power.
Author (ESA)

N86-17717# Southampton Univ. (England). Inst. of Sound and Vibration Research.
THE APPLICATION OF OPTIMAL CONTROL METHODS TO THE DECONVOLUTION OF VELOCITY METER SIGNALS
P. M. Clarkson Apr. 1985 36 p refs
(ISVR-TR-128) Avail: NTIS HC A03/MF A01

Optimal control was applied to deconvolution of velocimeter signals, and a method for maintaining effective deconvolution when data are corrupted by noise was developed. The effects of inaccuracy in estimating velocimeter parameters were studied. Results show that the effects may be approximately described by the ratio of the system function of the true system to that of the estimate. For the velocimeter, the effects of miscalculation of the resonant frequency and the damping ratio are demonstrated. Miscalculation degrades the deconvolution in the region of the resonance but in other areas has a relatively slight effect.
Author (ESA)

N86-17718# General Electric Co. Ltd., Wembley (England) VLSI Process Research Lab.
IMPROVED BLUE RESPONSE CCD-MA357 DETECTORS Final Report
D. J. Burt Paris ESA Jan. 1985 24 p refs
(Contract ESTEC-4487/80/NL-HP(SC))
(GEC-16,879C; ESA-CR(P)-2069) Avail: NTIS HC A02/MF A01

Experiments to improve the blue response of the front-illuminated MA357 385x576 photoelement CCD by modifying the electrode structure such that a significant fraction of the sensitive area is free of polysilicon electrodes are summarized. Although successful in achieving improved response, with the quantum efficiency increasing from a few percent to 25% at a wavelength of 400 nm, this is at the expense of an unacceptable deterioration of charge transfer efficiency. More suitable structures utilizing the same basic principle are suggested. Author (ESA)

N86-17719# Research Inst. of National Defence, Linkoeping (Sweden).
ELECTRO-OPTICAL AERIAL RECONNAISSANCE CAMERA: AN EXPERIMENTAL SYSTEM USED IN A SIMULATED RECONNAISSANCE ENVIRONMENT
Bruno Engstroem, Bjoern Nilsson, and Sten Nyberg Jun. 1985 35 p refs In SWEDISH; ENGLISH summary
(FOA-C-30394-E1; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

A system for generating, storing, and handling of pictures taken with a line scanning CCD camera, used to collect pictures of simulated air reconnaissance scenes is described. A digital image analysis is presented. The analysis tries to distinguish more or less probable vehicles for the operator from the image; the objects (vehicles) are generally darker than the landscape. It is shown that the combination CCD-camera and a landscape model gives good image material for photoreconnaissance investigations.
Author (ESA)

N86-17720# Fraunhofer-Inst. fuer Festkoerpertechnologie, Munich (West Germany).
DEVELOPMENT OF SENSORS ON THE BASIS OF POLYCRYSTALLINE SILICON Final Report, Aug. 1983
Ernst Obermeier, Felix vonKienlin, and Ho-Jung Hwang Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985

156 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-068; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32

Properties of polycrystalline silicon layers that are important for sensor applications were investigated. Layers were deposited from the gaseous phase through atmospheric pressure and low pressure chemical vaccuum deposition onto thermally oxidized single crystalline silicon wasfers; doping was carried out by ion implantation. Electrical properties, temperature behavior, and strain sensitivity were investigated. It is found that the temperature coefficients of polysilicon resistors can be determined within broad limits (negative, positive, zero) through selection of the doping. The layers are characterized by a relatively high piezoresistive effect. Based on experimental results, polysilicon thin film sensors (temperature, pressure, flow) were developed. These sensors clearly demonstrate the advantages of polycrystalline silicon layers as a sensor material. Author (ESA)

N86-17721# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
PREPARATION OF THE HELIUM-COOLED GERMAN INFRARED LABORATORY (GIRL) INTERFEROMETER FOR SCIENTIFIC USE ON SPACELAB [VORBEREITUNG DES HELIUMGEKUEHLTEN GIRL-INTERFEROMETERS ZUM WISSENSCHAFTLICHEN EINSATZ AUF SPACELAB]
Peter Essenwanger Jul. 1985 95 p refs In GERMAN
(MPE-192; ISSN-0178-0719) Avail: NTIS HC A05/MF A01

Preparation of a helium-cooled Michelson interferometer for high resolution IR spectroscopy of astronomical sources on the Spacelab telescope GIRL is summarized. Molecular parameters are provided as a basis for astrophysical observations. Critical problems in the adjustment and calibration of the sensitive interferometer were solved in the laboratory: a retroreflector was adjusted and tested, and a gas cell was built and tested for the calibration. Author (ESA)

N86-17722# Rijkswaterstaat, The Hague (Netherlands). Meetkundige Dienst.
THE UTILIZATION OF FALSE COLOR AERIAL PHOTOGRAPHY FOR MACROPHYTE BIOMASS ESTIMATION IN THE OOSTERSCHELDE (THE NETHERLANDS) [HET GEBRUIK VAN FALSE COLOURLUCHTFOTOGRAFIE BIJ DE SCHATTING VAN DE MACROFYTENBIOMASSA IN DE OOSTERSCHELDE]
Christina Meulstee and Hein vanStokkom Jan. 1985 28 p refs In DUTCH
(MDLK-R-8509) Avail: NTIS HC A03/MF A01

The correlation between the biomass of sea grass and seaweed samples in a sidebranch of the Oosterschelde delta (Netherlands) and density ratios of this area on color infrared aerial photographs was investigated. As the Oosterschelde will become more divided from the North Sea after pier dam completion, an increase of macrophytes is expected. In an area where the weeds Ulva, Cheatomorpha, Entermorpha, Cladophora, Fucus vesuculosis, and the grasses Zostera noltii and Zostera marina are found, 53 biomass samples of a 0.054 sq m surface each were collected. The relation between covering degree and biomass was estimated. Using a transmission-densitometer adjusted to 3 to 1 mm, densities on 1:10,000 and 1:20,000 scale photographs were measured. A gage line was determined in a density-biomass diagram. The method is shown to be useful for an efficient, accurate biomass determination in the Oosterschelde. Author (ESA)

N86-17723# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie.
HEAT IMAGE GENERATORS: STATE OF AFFAIRS BY THE EXPLORATION OF SOME POSSIBILITIES
J. W. A. M. Alferdinck and D. vanNorren Aug. 1985 34 p refs In DUTCH; ENGLISH summary
(Contract A81/KL/116)
(IZF-1985-15; TDCK-93327) Avail: NTIS HC A03/MF A01

Two principles of heat image generators for testing cameras sensitive to natural heat radiation from a scene, the Bly-cell and a matrix of Peltier-elements (MPE) are considered. The Modulation Transfer Function (MTF) of the Bly-cell, which consists of a thin goldblack coated membrane suspended in vacuum, was measured with a forward looking infrared system (FLIR). The MTF appears to improve by decreasing the pressure from 760 Torr to 0.00016 Torr and by increasing the input irradiance from 110 to 2100 W/sq m. The MTF given by Bly is not reached. The theoretical possibility of an MPE is discussed and the cost as a function of the resolution is estimated. A heat image generator principle based on a liquid crystal light valve is discussed. Author (ESA)

N86-17724# Societe Crouzet, Valence (France). Dept. Capteurs.
ELASTIC WAVE GYROMETER Final Report [GYROMETRE A ONDES ELASRTIQUES]
H. Fima 24 Apr. 1984 25 p In FRENCH
(Contract DRET-83-056)
(Rept-26/5052) Avail: NTIS HC A02/MF A01

The feasibility of applying the parametric waves produced by two Rayleigh waves traveling in opposite directions to measure angular displacement is analyzed. An experimental device produced a small amplitude parametric wave. The analysis shows that the Coriolis acceleration changes only the amplitude of the parametric wave in a first order perturbation computation. Larger order perturbations are not studied since the sensitivity would be to small. Author (ESA)

N86-17725# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
A PENDULUM IMPACTOR FOR MEASURING THE RESISTANCE OF MATERIALS TO JERK STRAINS
Torbjoern Svensson Jun. 1985 30 p In SWEDISH; ENGLISH summary
(FOA-C-20577-D4; ISSN-0347-3694) Avail: NTIS HC A03/MF A01

An instrument for quantifying the strength of materials exposed to high rates of strain is described. It is composed of an impactor and a transmistter bar. Impact velocities are 100 to 400 times/sec. Normal tensile testing bars or special shaped testing bodies may be used. The dynamic properties of the instrument were determined by experiments and computer simulation. The response of the instrument is incorporated into a computer code which is used to transform the captured signals to highly accurate stress-strain diagrams. Author (ESA)

N86-17726# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
DESCRIPTION OF A NONDESTRUCTIVE FACILITY USING HOLOGRAPHIC INTERFEROMETRY
P. Barbier and C. LeFloch 1985 6 p Presented at 11th World Conference on Nondestructive Testing, Las Vegas, Nev., 3-8 Nov. 1985
(SNIAS-852-430-105) Avail: NTIS HC A02/MF A01

A holographic interferometry procedure to test aircraft engine use manufactured using composite materials was developed. The equipment includes a laser source, a reading laser, a holographic camera, a chamber in which a depression can be created, and a control panel. The camera is placed inside the structure and revolves through 180 deg to observe the front and rear areas. Photographs of holograms obtained on a sample are presented. A surface of 0.5 sq m may be inspected in 15 min. The economic advantages of the test method are discussed. Author (ESA)

N86-17727# Danish Meteorological Inst., Copenhagen.
EXPERIENCES WITH THE DECLINATION-INCLINATION (DI) FLUXGATE MAGNETOMETER INCLUDING THEORY OF THE INSTRUMENT AND COMPARISON WITH OTHER METHODS
E. Kring Lauridsen 1985 34 p refs
(DMI-Geophys-Papers-R-71; ISBN-87-7478-253-3) Avail: NTIS HC A03/MF A01

Experience with the DI-flux, a magnetometer made from a theodolite with a fluxgate sensor fixed along the telescope is

described. Selected positions where the sensor is perpendicular to the geomagnetic field are found. Declination and inclination can be calculated. The theory and practice of the instrument is treated. Results from six month comparisons with other methods confirm the accuracy of the DI-flux. Author (ESA)

N86-17406# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
NONINTRUSIVE SHAFT SPEED SENSOR
S. Barkhoudarian and L. Wyett *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 257-269 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 14/2

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-17728 City Coll. of the City Univ. of New York.
SPECTRAL AND TEMPORAL PROPERTIES OF THE ALPHA AND BETA SUBUNITS AND (ALPHA BETA) MONOMER ISOLATED FROM NOSTOC sp. USING PICOSECOND LASER SPECTROSCOPY Ph.D. Thesis
Aaron J. Dagen 1985 250 p
Avail: Univ. Microfilms Order No. DA8515616

The fluorescence decay profiles, relative quantum yield and transmission of the alpha, beta and (alpha beta) complexes from phycoerythrin isolated from the photosynthetic antenna system of Nostoc sp. and measured by single picosecond laser spectroscopic techniques is studied. The fluorescence decay profiles of all three complexes are found to be intensity independent for the intensity range investigated (approx. 4x10 to the 13th power to 4x10 to the 15th power photons/sq cm per pulse). The apparent decrease in the relative quantum yield of all three complexes as intensity increases is offset by a corresponding increase in the relative transmission. This evidence, along with the intensity independent fluorescence kinetics, suggests that exciton annihilation is absent in these complexes. The decay profiles are fit to models assuming energy transfer amongst fluorescing chromophores. The intraprotein transfer rate is found to be 100 ps in the alpha subunit, 666 ps in the beta subunit. Constraining these rates to be identical in the monomer results in explaining the monomer kinetics by an increase in the nonradiative rate of the f beta chromophore, an apparent result of aggregation effects. Dissert. Abstr.

N86-17729 Maryland Univ., College Park.
A STUDY OF CONTINUOUS WAVE LASING AND MODELOCKING IN A NEODYMIUM-PHOSPHATE GLASS CRYSTAL Ph.D. Thesis
Scott Arthur Strobel 1984 134 p
Avail: Univ. Microfilms Order No. DA8514588

Continuous wave or CW lasing in many crystals has proven impossible because of thermal loading effects. Especially prone are crystals with a large spectral bandwidth whereby lasing threshold is somewhat high. Crystals in the shape of rods and rectangular slabs have been tried successfully, and the results of stress calculations indicate the efficiency of the end pump geometry and how the stress distribution changes for the different crystal shapes. CW powers of more than 40 milliwatts at 1.054 microns have been obtained from the neodymium:phosphate glass crystal with an argon laser (5145 a) jump power of 1.4 watts. CW modelocked pulse trains were obtained by an active technique with an intracavity acousto-optic modulator. The modulation process turns out to be due to a combination of amplitude and phase modification. Modelocking with a saturable absorber (passive technique) is discussed and it is shown that because of the long lifetime of the gain medium further research to develop a reverse saturable absorber is necessary to optimize the passive technique. Dissert. Abstr.

N86-17730 Oregon Univ., Eugene.
LITHIUM SOFT X-RAY LASER Ph.D. Thesis
Hiroshi Watanabe 1985 157 p
Avail: Univ. Microfilms Order No. DA8514814

This study explores a possibility of producing coherent photons in soft X-ray region. Photons are to be emitted from lithium ions. The generated photon corresponds to the transition between the second excited state and the ground state of a singly ionized lithium ion. Creation of the excited state occurs in two separate steps. First, the first excited state of the lithium ion is created through the inner-shell photoionization of a neutral lithium atom in its ground state. Second, the so-created first excited state of the lithium ion is lifted up to the second excited state which subsequently decays to the ground state of the lithium ion by spontaneous emission. One spontaneously decayed photon initiates subsequent stimulated emission of photons in coherent manner. The use of synchrotron generated high energy photons for inner-shell photoionization is emphasized. The required conditions for successful laser action area explicitly stated. Dissert. Abstr.

N86-17731*# Brown Univ., Providence, R. I.
THEORETICAL STUDIES OF RESONANCE ENHANCE STIMULATED RAMAN SCATTERING (RESRS) OF FREQUENCY DOUBLED ALEXANDRITE LASER WAVELENGTHS IN CESIUM VAPOR Semiannual Report
N. M. Lawandy 14 Jan. 1986 10 p refs
(Grant NAG5-526)
(NASA-CR-176464; NAS 1.26:176464) Avail: NTIS HC A02/MF A01 CSCL 20E

It is well known that the presence of a real atomic level which is nearly resonant with the pump field can greatly enhance the Raman emission cross section. In order to accurately calculate the Raman gain in systems where resonance enhancement plays a dominant role, expressions for the pump and signal susceptibilities must be derived. These expressions should be valid for arbitrary field strengths in order to allow for pump and signal saturation. In addition, the theory should allow for arbitrary longitudinal and transverse relaxation rates. This latter point is extremely vital for three level atomic systems such as the alkali earth metals since they do not have population reservoirs and can have widely varying spontaneous lifetimes on the three pertinent transitions. Moreover, the dephasing rates are strong functions of electron states and are therefore also different for the three coupled pairs of levels. These considerations are not as important when molecular systems are concerned since the large reservoir of rotational states serve to produce essentially equal longitudinal recovery rates for the population of the three levels. The three level system with three arbitrary longitudinal and transverse relaxation rates was solved. There is no need for setting either pair of rates equal and the expressions are valid for arbitrarily strong fields. Author

N86-17732# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
DEVELOPMENT OF SOLID STATE VIBRATIONAL LASERS Final Report, 1 Apr. 1984 - 31 Mar. 1985
A. J. Sievers 1 Aug. 1985 15 p
(Contract DAAG29-84-K-0034)
(AD-A159817; ARO-21574.1-PH) Avail: NTIS HC A02/MF A01 CSCL 20/5

Continuous-wave lasing in the 5 micrometers wavelength region has been obtained on the 2 to 1 vibrational transition of impurity CN- ions in KBr. Population inversion is produced by optical pumping of the weakly allowed first-overtone level of the molecule with a tunable (F2(+)) sub A color center laser. We have investigated the energy budget of this solid-state vibrational laser when the v = 2 upper laser level is pumped with a CW color center laser. Using pulsed fluorescence techniques and numerical simulations, we find that due to vibrational energy exchange between pairs of CN- ions in the v = 1 lower level, waste pump energy is recycled to the v = 2 upper level. Ideally the efficiency of this recycling scheme approaches unity, but due to energy transfer into higher vibrational levels, and because of spectral diffusion within the inhomogeneously broadened CN- profile, the

observed recycling efficiency is reduced. To our knowledge this is the first experiment demonstrating defeat of the Manley-Rowe limit. GRA

N86-17733# Hampton Inst., Va. Dept. of Physics and Engineering Studies.
INTENSE EXCITATION SOURCE OF BLUE-GREEN LASER Annual Summary Report, 1 Oct. 1984 - 30 Sep. 1985
K. S. Han 15 Oct. 1985 20 p
(Contract N00014-80-C-0957; NR Proj. RR0-1109)
(AD-A160303) Avail: NTIS HC A02/MF A01 CSCL 20/5

An intense and efficient excitation source for blue-green lasers useful for the space-based satellite laser applications, underwater strategic communication, and measurement of ocean bottom profile is being developed. The source in use, hypocycloidal pinch plasma (HCP), and a newly designed dense-plasma focus (DPF) can produce intense UV photons (200 to 300 nm) which match the absorption spectra of both near UV and blue green dye lasers (300 to 400 nm). During the current project period, the successful enhancement of blue-green laser output of both Coumarin 503 and LD490 dye through the spectral conversion of the HCP pumping light has been achieved with a converter dye BBQ. The factor of enhancement in the blue-green laser output energy of both Coumarin 503 and LD490 is almost 73%. This enhancement will definitely be helpful in achieving the direct high power blue-green laser (> 1 MW) with the existing blue green dye laser. On the other hand the dense-plasma focus (DPF) with new optical coupling has been designed and constructed. For the optimization of the DPF device as the UV pumping light source, the velocity of current sheath and the formation of plasma focus have been measured as function of argon or argon-deuterium fill gas pressure. Finally, the blue-green dye laser (LD490) has been pumped with the DPF device for preliminary tests. Experimental results with the DPF device show that the velocity of the current sheath follows the inverse relation of sq st. of pressure as expected. The blue-green dye (LD490) laser output exceeded 3.1 m at the best cavity tuning of laser system. This corresponds to 3J/1 cu cm laser energy extraction. GRA

N86-17734# Los Alamos National Lab., N. Mex.
DESIGN AND PERFORMANCE OF LARGE AREA MONOLITHIC ELECTRON GUNS FOR THE AURORA KrF LASER SYSTEM
M. Kang, L. A. Rosocha, V. O. Romero, F. W. VanHaaften, and J. P. Brucker 1985 14 p Presented at the 5th IEEE Pulsed Power Conference, Washington, D.C. 10 Jun. 1985
(Contract W-7405-eng-36)
(DE85-014112; LA-UR-85-2077; CONF-850616-68) Avail: NTIS HC A02/MF A01

Aurora is an inertial confinement fusion laser system using optical angular multiplexing and a chain of four cold cathode electron beam driven KrF laser amplifiers to produce 10 to 20 kJ of optical energy. Data on temporal measurements of cathode current, voltage, and spatial measurements of current density for representative e-guns are presented together with measurements on energy deposition in the laser gas medium. DOE

N86-17735# California Univ., Berkeley. Lawrence Berkeley Lab.
COLLECTIVE EFFECTS AND LATTICE IMPLICATIONS FOR AN FEL BYPASS RING
J. Bisognano, A. Jackson, and M. S. Zisman May 1985 6 p refs Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016563; LBL-19488; CONF-850504-243) Avail: NTIS HC A02/MF A01

Optimizing the performance of a single-pass free electron laser (FEL) in a storage ring requires a stored beam having both a relatively high volume density and a low momentum spread. These requirements place severe constraints on storage ring design due to the impact of both coherent and incoherent multiparticle phenomena. In this paper we present approximate scaling laws that elucidate the relative importance of various lattice parameters, and we will describe a systematic approach (embodied in the computer code ZAP) to parameter selection. DOE

N86-17736# Science Applications, Inc., Pleasanton, Calif.
TECATE: A CODE FOR ANISOTROPIC THERMOELASTICITY IN HIGH-AVERAGE-POWER LASER TECHNOLOGY, PHASE 1 Final Report
R. J. Gelinas, S. K. Doss, and N. N. Carlson 1 Jan. 1985 212 p
(Contract W-7405-eng-48)
(DE85-016067; UCRL-15677) Avail: NTIS HC A10/MF A01

This report describes a totally Eulerian code for anisotropic thermoelasticity (code name TECATE) which may be used in evaluations of prospective crystal media for high-average-power lasers. The present TECATE code version computes steady-state distributions of material temperatures, stresses, strains, and displacement fields in 2-D slab geometry. Numerous heat source and coolant boundary condition options are available in the TECATE code for laser design considerations. Anisotropic analogues of plane stress and plane strain evaluations can be executed for any and all crystal symmetry classes. As with all new and/or large physics codes, it is likely that some code imperfections will emerge at some point in time. DOE

N86-17737# Los Alamos National Lab., N. Mex.
MEASUREMENT OF FARADAY ROTATION IN TWISTED OPTICAL FIBER USING ROTATING POLARIZATION AND ANALOG PHASE DETECTION
G. I. Chandler, P. R. Forman, and F. C. Jahoda 1985 10 p Presented at SPIC International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif. 18 Aug. 1985
(Contract W-7405-eng-36)
(DE85-015704; LA-UR-85-2485; CONF-850887-17) Avail: NTIS HC A02/MF A01

We demonstrated phase modulation of rotating linearly polarized light by current-induced Faraday rotation in single mode optical fiber and used the technique to measure the current in ZT-40M, a Reversed-Field Pinch. We have also demonstrated the practicality of using twisted sensing fiber to overcome the problems associated with linear birefringence. DOE

N86-17738# Los Alamos National Lab., N. Mex.
METAL FILM DEPOSITION BY LASER BREAKDOWN CHEMICAL VAPOR DEPOSITION
T. R. Jervis 1985 39 p Presented at the NATO Advanced Study Institute, San Mianiato, Italy, 2 Sep. 1985
(Contract W-7405-eng-36)
(DE85-017554; LA-UR-85-2902; CONF-8509150-1) Avail: NTIS HC A03/MF A01

Dielectric breakdown of gas mixtures can be used to deposit homogeneous thin films by chemical vapor deposition with appropriate control of flow and pressure conditions to suppress gas phase nucleation and particle formation. Using a pulsed CO2 laser operating at 10.6 microns where there is no significant resonant absorption in any of the source gases, we have succeeded in depositing homogeneous films from several gas phase precursors by gas phase laser pyrolysis. Nickel and molybdenum from the respective carbonyls and tungsten from the hexafluoride have been examined to date. In each case the gas precursor is buffered to reduce the partial pressure of the reactants and to induce breakdown. The films are spectrally reflective and uniform over a large area. Films have been characterized by Auger electron spectroscopy, X-ray diffraction, pull tests, and resistivity measurements. The highest quality films have resulted from the nickel depositions. Detailed X-ray diffraction analysis of these films yields a very small domain size (approx. 50 A) consistent with rapid quenching from the gas phase reaction zone. This analysis also shows nickel carbide formation consistent with the temperature of the reaction zone and the Auger electron spectroscopy results which show some carbon and oxygen incorporation (8% and 1% respectively). Gas phase transport and condensation of the molybdenum carbonyl results in substantial carbon and oxygen contamination of the molybdenum films requiring heated substrates, a requirement not consistent with the goals of the program to

maximize the quench rate of the deposition. Results from tungsten deposition experiments representing a reduction chemistry instead of the decomposition chemistry involved in the carbonyl experiments are also reported. DOE

N86-17739# Department of Energy, Washington, D. C.
DENSITY GRADIENT FREE ELECTRON COLLISIONALLY EXCITED X-RAY LASER Patent Application
E. M. Campbell (Lawrence Livermore National Lab., Calif.) and M. D. Rosen, inventors (to DOE) (Lawrence Livermore National Lab., Calif.) Filed 29 Nov. 1984 30 p
(Contract W-7405-eng-48)
(DE85-017726; US-Patent-Appl-SN-676338) Avail: NTIS HC A03/MF A01

An operational X-ray laser is provided that amplifies 3p-3s transition X-ray radiation along an approximately linear path. The X-ray laser is driven by a high power optical laser. The driving line focused optical laser beam illuminates a free-standing thin foil that may be associated with a substrate for improved structural integrity. This illumination produces a generally cylindrically shaped plasma having an essentially uniform electron density and temperature, that exists over a long period of time, and provides the X-ray laser gain medium. The X-ray laser may be driven by more than one optical laser beam. The X-ray laser has been successfully demonstrated to function in a series of experimental tests. DOE

N86-17740# Department of Energy, Washington, D. C.
APPARATUS FOR LASER BEAM PROFILE MEASUREMENTS Patent Application
N. P. Barnes and D. J. Getteny, inventors (to DOE) Filed 30 Jan. 1985 10 p Prepared in cooperation with LANL
(Contract W-7405-eng-36)
(DE85-017789; US-Patent-Appl-SN-696549) Avail: NTIS HC A02/MF A01

Apparatus for measuring the spatial intensity profile of the output beam from a continuous-wave laser oscillator. The rapid and repetitive passing of a small aperture through the otherwise totally blocked output beam of the laser under investigation provides an easily interpretable, real-time measure of the intensity characteristics thereof when detected by a single detector and the signal generated thereby displayed on an oscilloscope synthronized to the motion of the aperture. DOE

N86-17741# Department of Energy, Washington, D. C.
EXCIMER LASER PHOTOTHERAPY FOR THE DISSOLUTION OF ABNORMAL GROWTH Patent Application
D. M. Gruen, C. E. Young, and M. J. Pellin, inventors (to DOE) Filed 19 Feb. 1985 18 p Prepared in cooperation with Argonne National Lab.
(Contract W-31-109-eng-38)
(DE85-017803; US-Patent-Appl-SN-702569) Avail: NTIS HC A02/MF A01

Removal of abnormal human tissue with reduced thermal damage is achieved by selecting a laser having a wavelength in the order of 290 to 400 nm, orienting a laser-transmitting glass member toward the abnormal tissue and directing the laser through the glass member at power densities, pulse rates, and times sufficient to cause multiphoton absorption and bond breaking by Coulomb repulsion rather than thermal destruction. The glass member may include a laser beam concentrator provided by a lens or cone at the tissue-treatment end to increase the beam energy per unit area and reduce the treatment area. DOE

N86-17742# Rochester Univ., N. Y. Lab. for Laser Energetics.
THERMAL TRANSPORT, MASS-ABLATION AND PREHEAT IN LASER-TARGET EXPERIMENTS
B. Yaakobi 1985 41 p Presented at the Spring College on Radiation in Plasmas, Trieste, Italy, 1 Jun. 1985
(Contract DE-AC08-80DP-40124)
(DE85-017584; DOE/DP-40124/74; CONF-8506189-1) Avail: NTIS HC A03/MF A01

Thermal transport in laser-target irradiation experiments has been studied by X-ray spectroscopic methods. Mass ablation rates and ablation pressures can be derived from these and other measurements. Even though the measurements from various laboratories do not always agree, a general picture seems to emerge: (1) thermal transport is less inhibited in spherical irradiation geometry, as compared with single beam irradiation of flat targets; (2) thermal transport tends towards a classical behavior, i.e., with no need to invoke flux inhibition, for short wavelength irradiation of large spherical targets, and (3) mass ablation rates are higher at shorter wavelength irradiation, even when compared at the same absorbed irradiance. DOE

N86-17743# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.
A CO2 LASER SCINTILLOMETER FOR C(2) SUB n MEASUREMENTS OVER A MANY KILOMETER PATH
W. Kohsiek 1985 25 p refs
(KNMI-TR-67; ISSN-0169-1708) Avail: NTIS HC A02/MF A01

A CO2 laser scintillometer for the measurement of refractive index over pathlengths from 100 m to 10 km is described. Electronic adjustment procedures, calibration, and the operation region of the instrument are outlined. The scintillometer performs well in tests over path lengths of 449, 5900, and 9700 m.
Author (ESA)

N86-17643# Joint Publications Research Service, Arlington, Va.
METROLOGICAL PROVISION FOR MEASUREMENT OF RELATIVE ENERGY DENSITY DISTRIBUTION OVER BEAM CROSS SECTION AND OF BEAM DIVERGENCE IN PULSE LASERS
A. F. Kotyuk, V. B. Korshikov, B. M. Stepanov, S. V. Tikhomirov, and V. A. Yakovlev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 24-25 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 13-14 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17644# Joint Publications Research Service, Arlington, Va.
MULTICHANNEL COMMUTATORS OF ANALOG SIGNALS FOR MEASUREMENT OF ENERGY DISTRIBUTION OVER BEAM CROSS SECTION OF PULSE LASER
A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 25-26 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 14-16 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17645# Joint Publications Research Service, Arlington, Va.
THE 400-CHANNEL COMMUTATOR FOR MEASUREMENT OF ENERGY DISTRIBUTION IN LASER BEAM
V. L. Chereugin and A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 26 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 16-18 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17646# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF ERROR OF MEASUREMENT OF RELATIVE ENERGY OR POWER DENSITY DISTRIBUTION OVER CROSS SECTION OF LASER BEAM ON SPACE FACTOR OF MULTIELEMENT RADIATION TRANSDUCER
Ya. T. Zagorskiy and Yu. V. Karabak *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 18-19 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17647# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC INSTRUMENT FOR MEASURING RELATIVE ENERGY DENSITY DISTRIBUTION IN BEAMS OF PULSE LASERS
V. I. Arbekov, M. V. Ulanovskiy, Ya. T. Zagorskiy, A. M. Levi, and A. I. Glazov *In its* USSR Report: Electronics and Electrical

Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27-28 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 21-22 (For primary document see N86-17640 08-33) Avail: NTIS HC A03/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-17744 British Library Lending Div., Boston Spa (England).
POSSIBILITIES OF PROTECTION FROM ABRASIVE AND ADHESIVE WEAR
G. Stahli [1985] 12 p refs Transl. into ENGLISH from Oberflache-Surface, Zurich, v. 8, 25 Jan. 1978 Presented at the Swiss Electrotech. Meeting, Zurich, 25 Jan. 1978
(BLL-Risley-Tr-5166-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Wear research shows that wear of materials can be understood not as a materials property but as a property of a complex tribological system. Such a system comprises a base and counterface material with certain surface geometry and an intervening medium and an environment medium. The action of an external loading group produce very different wear mechanisms. Two primarily mechanical types of wear mechanism which combine in many cases of wear and the material possibilities of wear reduction are discussed. The importance of the type of wear present in particular cases to the evaluation of the wear resistance is shown. Giving a comparable view is in general possible with results from model wear tests under quite defined and simple conditions. The work is done at room temperature, relatively low stress (3 kg/sq m) and speeds of 25 m/min and without any lubrication to emphasize the effect of the materials. The results lead to a generally valid relationship and provide an ordered comparison for new materials and material treatments. E.A.K.

N86-17745 British Library Lending Div., Boston Spa (England).
UPSETTING OF VISCOPLASTIC MEDIUM BETWEEN TWO RIGID PLATES IN PRESENCE OF FRICTION
Yu. I. Blinov, V. V. Zaitsev, and S. B. Maksimov 1985 8 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 2, 1985 p 33-37
(BLL-M-36390-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A method which enables the solution of boundary value problems to be reduced to successive integration of linear fourth order equations is presented. By means of perturbation expansion, the boundary-value problem of compression of a viscoplastic medium during upsetting between two rigid plates is reduced to integration of a linear fourth-order equation. The coefficient of friction is used as the perturbation. The method can be used to calculate parameters of flow of viscoplastic lubricant in processes of mechanical working of metals. E.A.K.

N86-17746 Wayne State Univ., Detroit, Mich.
FAULT ANALYSIS IN DYNAMIC SYSTEMS WITH APPLICATION TO RECIPROCATING COMBUSTION ENGINES Ph.D. Thesis
Ali Amin Fahs 1985 205 p
Avail: Univ. Microfilms Order No. DA8514129

The problem of fault analysis can be divided into three parts: fault detection, diagnosis and location, and reconfiguration or repair. This study introduces two general approaches for fault analysis in dynamic systems, which are described by ordinary differential equations. The first approach requires continuous monitoring of the output variables of the system. Under normal conditions these variables follow a nominal time-history. Under abnormal conditions they deviate from this nominal history. Fault analysis is accomplished by measuring these deviations. The other approach involves the following: (1) development of an analytical model, (2) identification of model parameters, (3) and development of discriminant functions and decision rules for fault classifications. The two approaches are applied to fault analysis in a reciprocating combustion engine. The engine is a multivariate system of nonlinear nature. The design of an engine deficiency analyzer requires the extraction of useful information. Deficient engine operation affects the regularity of the instantaneous angular velocity of the flywheel. Dissert. Abstr.

N86-17747 British Library Lending Div., Boston Spa (England).
[A METHOD OF FABRICATING SILICON CARBIDE MOULDINGS]
31 Oct. 1985 11 p Transl. into ENGLISH of Japanese Patent (Application no. 81222, 1977)
(BLL-Risley-Tr-5206-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

The present invention relates to a method of fabricating silicon carbide mouldings. After the mixture comprising silicon carbide powder, carbon powder and thermally decomposed polyorganopolysilane is moulded, molten metallic silicon is allowed to penetrate into these mouldings. Although this method has the advantage that products of different shapes can be fabricated easily compared with the so-called hot press method where a mixture of, for example, SiC powder and magnesia powder are moulded using a hot press, since a temporary binding agent comprising an organic material is used, the primary moulding and the secondary moulding before penetration of the metallic silicon are of low strength and machining of high dimensional precision cannot be carried out at this stage. Moreoever, since mouldings where metallic silicon is allowed to penetrate into secondary mouldings and is converted to SiC have a Vickers hardness greater than 3200, there is the disadvantage that only diamond tools can be used for machining and the machining costs are high. Author

N86-17748*# Transmission Research, Inc., Cleveland, Ohio.
CONSTITUTIVE MODELLING OF LUBRICANTS IN CONCENTRATED CONTACTS AT HIGH SLIDE TO ROLL RATIOS Interim Report
J. L. Tevaarwerk Dec. 1985 85 p refs
(Contract DEN3-35)
(NASA-CR-175029; NAS 1.26:175029; IR-4) Avail: NTIS HC A05/MF A01 CSCL 11H

A constitutive lubricant friction model for rolling/sliding concentrated contacts such as gears and cams was developed, based upon the Johnson and Tevaarwerk fluid rheology model developed earlier. The friction model reported herein differs from the earlier rheological models in that very large slide to roll ratios can now be accommodated by modifying the thermal response of the model. Also the elastic response of the fluid has been omitted from the model, thereby making it much simpler for use in the high slide to roll contacts. The effects of this simplification are very minimal on the outcome of the predicted friction losses (less than 1%). In essence then the lubricant friction model developed for the high slide to roll ratios treats the fluid in the concentrated contact as consisting of a nonlinear viscous element that is pressure, temperature, and strain rate dependent in its shear response. The fluid rheological constants required for the prediction of the friction losses at different contact conditions are obtained by traction measurements on several of the currently used gear lubricants. An example calculation, using this model and the fluid parameters obtained from the experiments, shows that it correctly predicts trends and magnitude of gear mesh losses measured elsewhere for the same fluids tested here. Author

N86-17749# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ANALYSIS OF A GAS GENERATOR SYSTEM Final Technical Report
C. W. Nelson and D. E. Kooker Apr. 1985 37 p
(DA Proj. 1L1-61102-AH-43)
(AD-A156999; AD-E950724; BRL-TR-2648) Avail: NTIS HC A03/MF A01 CSCL 13/7

A small gas generator suddenly failed in acceptance tests after a string of successes. Intensive tests and rough calculations said that heat transfer to the cold surroundings, coupled with a

change in burning-rate exponent at low pressure, caused the failure. Two math models, a lumped parameter model and a full one-dimensional fluid mechanics model were devised to explain the interaction among combustion, heat transfer, and fluid mechanics. The models predict that a reasonable estimate of heat loss does not, by itself, explain the failures. The success of an isolation venturi can only be partially explained by heat transfer. Suspicion then rests on the assumption of equilibrium combustion thermodynamics at the very cold temperatures where the failures occurred. Variations with age and propellant batch are still not exonerated, even though the critical problem seems to have been solved.
GRA

N86-17750# Allied Bendix Corp., Kansas City, Mo.
ROBOTIC DEBURRING: A BIBLIOGRAPHY
L. K. Gillespie Jul. 1985 19 p Presented at the Deburring and Surface Conditioning Conference, Chicago, Ill., 26 Sep. 1985
(Contract DE-AC04-76DP-00613)
(DE85-015760; BDX-613-3317; CONF-8509132-1) Avail: NTIS HC A02/MF A01

A bibliography is presented on every known reference to robotic deburring. The majority of the citations represent full papers on the subject, however, a few represent only passing comments on the subject. The brief mentions are included because robotic deburring is still in its infancy, and the mere recognition that a robot is deburring sheet metal or plastics or some other equally unique citation is of itself noteworthy. E.A.K.

N86-17751# Sandia National Labs., Albuquerque, N. Mex.
VACUUM ARC REMELTING: AN OVERVIEW
Frank J. Zanner and Lee A. Bertram 1985 41 p refs Presented at conference
(DE85-016458; SAND-85-1509C; CONF-8509136-1) Avail: NTIS HC A03/MF A01

Vacuum arc remelting (VAR) which is a casting process carried out in a vacuum with the aim of melting a consumable electrode in such a way that the new ingot has improved chemical and physical homogeneity is discussed. The historical use of VAR is outlined. From the 1940s to the present, the process was steadily improved by evolutionary design and shop practice, and is the most heavily capitalized process used in the world to produce superalloy, stainless steel, and high strength steel forging stock. The following areas are covered in chronological order: (1) arc physics and behavior; (2) metal transfer and electrode gap measurement; (3) boundary conditions on the crucible wall; and (4) pool dynamics and macrosegregation. E.A.K.

N86-17752# Department of Energy, Washington, D. C.
FLUIDIZING DEVICE FOR SOLID PARTICULATES Patent Application
J. P. Diebold and J. W. Scahill, inventors (to DOE) Filed 27 Jun. 1984 19 p
(Contract DE-AC02-83CH-10093)
(DE85-006504; US-Patent-Appl-SN-625327) Avail: NTIS HC A02/MF A01

A flexible whip or a system of whips with novel attachments is suspended in a hopper and is caused to impact against fibrous and irregularly shaped particulates in the hopper to fluidize the particulates and facilitate the flow of the particulates through the hopper. The invention provides for the flow of particulates at a substantially constant mass flow rate and uses a minimum of energy. DOE

N86-17753# Department of Energy, Washington, D. C.
MULTI-PORT VALVE ASSEMBLY Patent Application
S. F. Guggenheim, inventor (to DOE) (DOE, New York) Filed 16 Nov. 1984 23 p
(DE85-017769; US-Patent-Appl-SN-672229) Avail: NTIS HC A02/MF A01

A multiport fluid valve apparatus is used to control the flow of fluids through a plurality of valves and includes a web, which preferably is a stainless steel endless belt. The belt has an aperture therethrough and is progressed, under motor drive and control, so that its aperture is moved from one valve mechanism to another. Each of the valve mechanisms comprises a pair of valve blocks which are held in fluid-tight relationship against the belt. Each valve block consists of a block having a bore through which the fluid flows, a first seal surrounding the bore and a second seal surrounding the first seal, with the distances between the first and second seals being greater than the size of the belt aperture. In order to open a valve, the motor progresses the belt aperture to where it is aligned with the two bores of a pair of valve blocks, such alignment permitting a flow of the fluid through the valve. The valve is closed by movement of the belt aperture and its replacement, within the pair of valve blocks, by a solid portion of the belt. DOE

N86-17754# Department of Energy, Washington, D. C.
MACHINE IMPARTING COMPLEX ROTARY MOTION FOR LAPPING A SPHERICAL INNER DIAMETER Patent Application
T. A. Carroll and H. H. Yetter, inventors (to DOE) Filed 30 Jan. 1985 14 p Prepared in cooperation with LANL
(Contract W-7405-eng-36)
(DE85-017790; US-Patent-Appl-SN-696550) Avail: NTIS HC A02/MF A01

An apparatus for imparting complex rotary motion is used to lap an inner spherical diameter surface of a workpiece. A lapping tool consists of a dome and rod mounted along the dome's vertical axis. The workpiece containing the lapping tool is held in a gimbal which uses power derived from a secondary takeoff means to impart rotary motion about a horizontal axis. The gimbal is rotated about a vertical axis by a take means while mounted at a radially outward position on a rotating arm. DOE

N86-17755# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF A CONTINUOUS-FLOW FLUIDIC PUMP
S. M. Robinson Aug. 1985 167 p refs
(Contract DE-AC05-84OR-21400)
(DE85-018152; ORNL/TM-9564) Avail: NTIS HC A08/MF A01

A study was made of a fluidic pump which utilizes gas pistons, a venturi-like reverse-flow-diverter, and a planar Y-type flow junction to produce a continuous flow of liquid from a system containing no moving parts. The study included an evaluation of the system performance and of methods for controlling the stability of the fluidic system. A mathematical model of the system was developed for steady-state operation using accepted theories of fluid mechanics. Although more elaborate models are needed for detailed design and optimization of specific systems, the model determined some of the main factors controlling the system performance and will be used in the development of more accurate models. DOE

N86-17756# Pacific Northwest Lab., Richland, Wash.
IDENTIFICATION OF TRIBOLOGICAL RESEARCH AND DEVELOPMENT NEEDS FOR LUBRICATION OF ADVANCED HEAT ENGINES
L. L. Fehrenbacher and T. M. Levinson Sep. 1985 67 p
(Contract DE-AC06-76RL-01830)
(DE85-018154; PNL-5537) Avail: NTIS HC A04/MF A01

The continuous evolution of higher power density propulsion systems has always fueled the search for materials and lubricants with improved thermal and/or durability characteristics. Tribology of the upper cylinder region is the major technology roadblock in the path of the adiabatic diesel engine which has an energy reduction potential that exceeds that of all other engine development types. This tribology assessment resulted in the following major conclusions: (1) a low friction and a low wear seal between the ring belt and cylinder bore are the most critical tribology functions in the diesel combustion chamber; (2) development of solid lubrication systems will not satisfy the simultaneous low friction and low wear requirements in the upper cylinder area; and (3) development of separate upper cylinder liquid lubrication systems offers the most attractive design alternative for meeting the operational goals of future minimum cooled diesel engines.
DOE

N86-17757# Argonne National Lab., Ill.
HEAT TRANSFER IN INTERNAL COMBUSTION ENGINES
C. S. Wang and G. F. Berry Apr. 1985 20 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-011495; CONF-851125-5) Avail: NTIS HC A02/MF A01

A heat transfer model which uses quasi-steady heat flux relations to calculate the heat transfer from combustion gases through the cylinder wall to the coolant was developed. The convective heat transfer accounts for the physical problems of rotating and impinging axial flow inside the engine cylinder. The radiation heat transfer includes gas radiation (CO2, H2O and CO) and soot particle radiation. The wall temperatures can be accurately predicted from this model both for the gas and coolant sides of the cylinder walls. The heat transfer results for the motoring case of the present model are in good agreement with those from empirical correlations based on instantaneous heat flux data. The calculated radiation heat flux and gas emissivity show reasonable agreement with the existing data in the literature. DOE

N86-17758# Florence Univ. (Italy). Inst. of Energetics.
GAS TURBINES IN COGENERATION: OVERALL ANALYSIS AND NUMERICAL PREDICTIONS
G. Manfrida, S. S. Stecco, and A. Galletti (Turbotecnica SpA) 1985 7 p refs
Avail: NTIS HC A02/MF A01

A method for performance analysis of gas turbines for cogeneration applications is presented. Energy and energy balances allow presentation of data in terms of conventional or second-law parameters, as well as examination of the trends with respect to cycle variables and cogeneration options. The results show that even though gas turbines (and particularly regenerative solutions) are very flexible for cogeneration purposes, care has to be exercised in matching thermal energy production conditions and cycle variables in order to achieve optimal performance.
Author (ESA)

N86-17759# Florence Univ. (Italy). Inst. of Energetics.
A RATIONAL EFFICIENCY ANALYSIS OF COMPARISONS AND TRENDS IN GAS TURBINES FOR COGENERATION
Sergio S. Stecco and Giampaolo Manfrida 1985 5 p refs Sponsored by Max-Planck Inst.
Avail: NTIS HC A02/MF A01

The performance of gas turbines in cogeneration is examined by a second-law approach. Cycle parameters for simple and regenerative design are investigated together with options for process or utility heat production. A reference electric power size of 4 MW is assumed. Results are presented as a set of parameters (electric power index, rational efficiency, coefficient of utilization). A parameter named versatility index indicates the broadness of the design thermal loads which can be handled by a gas turbine plant. Author (ESA)

N86-17760# Bundesministerium des Innern, Bonn (West Germany).
EVALUATION OF FUNCTIONAL EXPERIENCE WITH SAFETY VALVES Final Report, Jan. 1985 [AUSWERTUNG VON BETRIEBSERFAHRUNGEN MIT SICHERHEITSARMATUREN]
W. Bung, P. Hoemke, W. Oberender, H. Paul, and W. Reuter Jun. 1985 207 p refs In GERMAN
(BMI-1985-080; ISSN-0724-3316) Avail: NTIS HC A10/MF A01

Functional tests of safety valves for nuclear power reactors were statistically investigated. The 2076 functional tests were carried out on power-operated safety valves in a conventional power plant, with special regard to common-mode failures (CMF). The contributions to the risk of primary exhaust and safety valves are discussed. Concepts for the reliable opening and closing are presented. The results clearly show that CMF's play on important role in the nonavailability of controlled safety valves, especially in the control system. Author (ESA)

N86-17761# Centre Technique des Industries Mecaniques, Senlis (France).
TOOL WEAR MONITORING SYSTEMS Final Report [MATERIELS DE SURVEILLANCE DE LA DEGRADATION DES OUTILS]
J. C. Tanguy 3 Jun. 1985 42 p refs In FRENCH
(CETIM-100560) Avail: NTIS HC A03/MF A01

Tool wear detectors, contact detectors, shaft power controllers, load control, noise emission control, and vibration control components are reviewed. The service life of tools are determined. Author (ESA)

N86-17762# Centre Technique des Industries Mecaniques, Senlis (France).
HIGH SPEED STEEL WORKING TOOLS Final Report [OUTILS POUR L'USINAGE A GRANDE VITESSE DES ALLIAGES FERREUX]
Saint-Chely, Geslot, Lefebvre, and Letellier Jun. 1985 64 p In FRENCH
(CETIM-102360) Avail: NTIS HC A04/MF A01

High speed steel machining to be applied to high speed milling machining with acceptable tool life was explored. Experiments were carried out in lathe machining. The tool materials investigated included boron nitride, aluminum oxide, titanium carbide and silicon. A positive result is shown using boron nitride tools to machine cast iron, with a life of $>$ 20 min at 2200 m/min. No positive results are obtained in steel machining. Author (ESA)

N86-17763# Kraftwerk Union A.G., Mulheim (West Germany). Bereich Gasturbinen.
DEVELOPMENT OF LOW-EMISSION GAS TURBINE COMBUSTION SYSTEMS Final Report, Mar. 1985
Peter Berenbrink, Vladimir Rosen, and Hans-Wilhelm Schabbehard Bundesministerium fuer Forschung und Technologie Bonn Jul. 1985 179 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-064; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34.50

Gas turbine combustion systems with reduced emissions, in particular of nitrogen oxides, were developed. Diffusion flame burners were improved to reduce emissions, by modifications of the burner and fuel nozzle geometry and by wet NOx control. A premixing flame burner was developed. A calculation procedure for the prediction of the formation of pollutants in a gas turbine combustion chamber was derived. The NOx-emissions of the diffusion flame burner are reduced to one third, and with wet control to one tenth of those of the initial burner. For gaseous fuel a premixing flame burner with low NOx-emission is available, for liquid fuel more research is required. A procedure for flow field and chemical reaction calculations was developed.
Author (ESA)

N86-17764# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Meten en Regelen.
WELD SEAM-TRACKING WITH AN OPTICAL SENSOR USING STRUCTURED LIGHT [LASNAADVOLGEN MET EEN OPTISCHE SENSOR, DIE GEBRUIK MAAKT VAN GESTRUCTUREED LICHT]
R. M. W. Notermans 1983 137 p refs In DUTCH; ENGLISH summary Original contains color illustrations
Avail: NTIS HC A07/MF A01

Two optical profile sensor principles for welding robots, based on the right angle projection of a light streak on the seam to transfer three-dimensional workpiece information, are presented. Using an HeNe-laser as light source and a video camera, and linear photoarray as sensors, an experimental set-up and an industrial prototype were examined. Realistic weld seam-tracking experiments were executed on a welding robot with two orthogonal degrees of freedom and extended control. Results show practicability of both sensor systems. Application in a welding problem in the off shore industry is discussed. Author (ESA)

N86-17765# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
SOME ASPECTS OF THE DYNAMIC BEHAVIOR OF AN ASSEMBLY ROBOT
K. C. P. Machielsen 1983 148 p refs
Avail: NTIS HC A07/MF A01

A mathematical model of the dynamic behavior of an assembly robot with five degrees of freedom, driven by four linear hydraulic servomotors and one vane-rotor type servomotor, was established for determining control strategies. The model is clearly structured due to a separate modeling of the arm mechanism and the servomotors. In modeling the arm mechanism, rigid body mechanics were assumed. The model is nonlinear, contains q time delays and is of the 25th order. The model was verified by comparing measured step responses of the robot with step responses of the model obtained via simulation. A modal analysis procedure was done to assess the validity of the assumption of rigid body mechanics. From the verification it follows that the model is suitable for determining control strategies. The assumption of rigid body mechanics is valid for low frequencies. A parameter sensitivity analysis of the actuator models reveals that the total model can be reduced to the 15th order. Author (ESA)

N86-17766# Groningen Rijksuniversiteit (Netherlands). Vrije Studierichting.
EFFICIENCY CALCULATION FOR GAS TURBINES: SEARCHING FOR SIMPLE RELATIONS BETWEEN THERMODYNAMIC EFFICIENCY OF A GAS TURBINE AND EFFICIENCY DETERMINING PARAMETERS [RENDEMENTS BEREKENING VOOR GASTURBINES: WAARIN GEZOCHT WORDT NAAR SIMPELE RELATIES TUSSEN HET THERMISCHE RENDEMENT VAN EEN GASTURBINE EN RENDEMENTS-BEPALENDE PARAMETERS]
1985 45 p refs In DUTCH
(SS-44) Avail: NTIS HC A03/MF A01

Relations between the thermodynamic efficiency and inlet temperature and compression ratio are determined for a simple gas turbine cycle, and for a regenerative cycle, using also a regenerative efficiency parameter. Investigating the optimal investment allocation with regard to production and utilization of steam and electricity in industry, heat-power cogeneration applications of (recuperative) gas turbines, combined with counterpressure steam turbines and/or boilers, are considered. These installations are described using a model in which thermodynamic efficiency is calculated as a function of several parameters. Based on the historical developments of turbine components, related to the parameters, a 58% efficiency improvement is predicted. Integration possibilities of gas turbines in heat-power installation are given.
Author (ESA)

N86-17767# Centre Technique des Industries Mecaniques, St. Etienne (France).
HOOPS Final Report [FRETTAGE]
J. Chalier 3 Oct. 1984 54 p refs In FRENCH
(CETIM-13-N-243) Avail: NTIS HC A04/MF A01

Hooping procedures are discussed, including the principles and applications, the computation of the load limits and practical aspects of computation of contraction or expansion. Author (ESA)

N86-17768# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
HIGH PRESSURE GAS STORAGE TANKS: A COMPROMISE BETWEEN SAFETY REGULATIONS AND PERFORMANCES
P. Charpentier and G. Reuille 1985 8 p Presented at AIAA/SAE/ASME 21st Joint Propulsion Conference, Monterey, Calif., 8-11 Jul. 1985
(SNIAS-852-430-115) Avail: NTIS HC A02/MF A01

A prestressed gas tank with titanium alloy liner carbon fiber composite roving, is described and its characteristics are discussed. The 51l tank is intended for TVSAT-TDF1 satellite use in substitution of a titanium liner, aramid fiber roving. The titanium liner has a minimum thickness of 0.9 mm. The composite uses IM6 prepreg carbon from Hercules. Burst pressure is 600 bar. The performance factor is 121% better than the all-titanium tank and 50% better than the aramid fiber tank. Author (ESA)

N86-17769# National Bureau of Standards, Boulder, Colo.
DUCTILE-TO-BRITTLE TRANSITION IN STEEL WELDMENTS FOR ARCTIC STRUCTURES
F. ZiaEbrahimi Apr. 1985 66 p Sponsored in part by Minerals Management Service, Reston, Va.
(PB85-227098; NBSIR-85/3020) Avail: NTIS HC A04/MF A01 CSCL 13E

The development of fracture criteria for steel weldments in arctic structures is reported. The ductile-to-brittle transition behavior of a shielded metal-arc weld, typical of steel weldments in arctic structures, was studied. Fracture toughness, Charpy V-notch impact energy, and tensile properties were measured as a function of temperature throughout the ductile-to-brittle transition range. The effect of geometric dimensions on fracture toughness was studied for the three geometries of single-edge-notch-bend (SENB) specimens. The fracture surfaces of broken specimens are characterized by scanning electron microscopy (SEM). The microstructure of the multiple pass weldment is studied by optical microscopy. The mechanical properties of the steel weldment are compared to the base metal, an ABS grade EH36 steel in normalized condition. GRA

N86-17770# Transportation Research Board, Washington, D.C.
INTERNATIONAL SYMPOSIUM ON MECHANICAL PROPERTIES OF SPECIAL CONCRETE
C. N. MacDonald, V. Ramakrishnan, R. J. Stebbins, C. W. Josifek, and J. D. Jeniec 1985 65 p Symp. held in Washington, D.C., Jan. 1984
(PB85-234961; TRB/TRR-1003; ISBN-0-309-03812-X; LC-85-11564) Avail: NTIS HC A04/MF A01 CSCL 13C

The mechanical properties of special concrete are discussed. The following areas are reported: plastic and steel fiber-reinforced concrete applications; superplasticized fiber-reinforced concretes for the rehabilitation of bridges and pavements; epoxy-bonded, steel fiber-reinforced thin cementitious overlay at Orlando International Jetport, Florida; low-temperature curing of polymer methacrylate polymer concrete; evaluation of rapid-setting concretes; shear transfer in two-layer composite systems; steel fiber shotcrete for rehabilitation of concrete structures; properties of latex-modified shotcrete beneficial to concrete repairs; applications of permanent precast polymer concrete forms for concrete rehabilitation; and, composite concrete pavements with roller-compacted concrete. GRA

N86-17408*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED SEALS FOR LIQUID OXYGEN (LOX) TURBOPUMPS
W. Shapiro, R. Hamm, and J. A. Hemminger (NASA. Lewis Research Center, Cleveland, Ohio) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 281-290 refs (For primary document see N86-17380 08-20)
(Contract NAS3-23260)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11A

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-17771 Drexel Univ., Philadelphia, Pa.
ULTRASONIC FEATURE MAPPING FOR ANOMALY IDENTIFICATION IN COMPOSITE MATERIALS AND ADHESIVELY BONDED STRUCTURES Ph.D. Thesis
John Bruce Nestleroth 1985 178 p
Avail: Univ. Microfilms Order No. DA8517062

A nondestructive testing technique was developed called Feature Mapping (F-map) to detect and identify anomalies so that possible failure situations can be avoided without rejecting structurally good material, a feature being defined inn this work as a particular shape or area under a curve characteristic of an ultrasonic waveform in either time, frequency, or transfer function domain. F-mapping uses pulsed ultrasonic energy to interrogate the material, with the information in the received signal quantified into features. Two sample problems to demonstrate the utility of the F-map technique are presented. A fiber reinforced composite material sample problem describes identification procedures for three common anomaly types; porosities, delamination and inclusion. The adhesive bonding sample problem examines the surface preparation variation problem and also corrosive attack of detection in aluminum to aluminum bonded structures.

Dissert. Abstr.

N86-17772# Oak Ridge Y-12 Plant, Tenn.

IN-PROCESS ACOUSTIC EMISSION MONITORING OF LASER WELDS

J. W. Whittaker, T. M. Mustaleski, and K. D. Nicklas Jul. 1985 7 p Presented at the 2nd International Conference on Acoustic Emission, Lake Tahoe, Nev., 28 Oct. 1985 Previously announced in IAA as A86-12586

(Contract DE-AC05-84OS-21400)

(DE85-017184; Y/DW-592; CONF-851162-2) Avail: NTIS HC A02/MF A01

Acoustic emission (AE) monitoring systems were developed for monitoring in-process pulsed and continuous wave (CW) laser welds. Thin sheet, coupon welds and very small, complex geometry component welds were monitored. The results indicate that a linear relationship exists between AE energy production and weld penetration in pulsed welds. A second relationship was discovered which indicates that optimum laser-focus position can be determined from relative AE energy production. Finally, preliminary results indicate that beam/seam misalignment can be determined from the AE generated during welding. DOE

N86-17773# Fraunhofer-Inst. fuer Zerstoerungsfreie Pruefverfahren, Saarbruecken (West Germany).

A CONCEPT FOR THE QUALITY ASSURANCE OF CERAMIC GAS TURBINE COMPONENTS USING NONDESTRUCTIVE TESTS Final Report, Aug. 1983

Klaus Goebbels, Holger Reiter, Walter Arnold, and Sigrun Hirsekorn Bonn Bundesministerium fuer Forschung und Technologie Aug. 1985 55 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-85-094; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11.50

Nondestructive testing (NDT) methods were developed for components made of high temperature and high strength ceramics, in a ceramic gas turbine program. The emphasis was on NDT methods for the detection of defects with linear dimensions between 10 and 100 micrometers. For the surface and volume defects, and the structure and stress measurement, three methods are summarized. Filmless high resolution radiography with microfocal X-ray tubes and projection technique testing is accomplished by cross section images of computer tomography with reduced resolution. Ultrasonic testing and ultrasonic microscopy with frequencies between 5 and 200 MHz are used for structure characterization (homogeneity) and stress measurement by low frequency (< or = 27 MHz) velocity measurements; detection of surface defects with surface waves; detection and characterization of volume defects with high frequency ultrasound vibration analysis (resonance frequency) is suitable for large sample series, and qualitative and integral characterization of components.

Author (ESA)

N86-17774# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.

QUADRINOMIAL DISTRIBUTION FOR THE CHARACTERIZATION OF NONDESTRUCTIVE INSPECTION (NDI) RELIABILITY

J. H. Heida 27 Jun. 1984 17 p refs Presented at 3rd European Conference on Nondestructive Testing, Florence, Italy, 15-18 Oct. 1984

(NLR-MP-84064-U; B8568524) Avail: NTIS HC A02/MF A01

Inclusion of probability of detection (POD) and probability of recognition (POR) of flaws in characterization of nondestructive inspection (NDI) reliability is considered. Possible measures for this characterization are discussed using inspection results of a test specimen population of 200 identical 4340 steel aircraft landing gear components rejected from service because of crack indications or exceedance of the safe service life. It is concluded that it is doubtful whether the discussed parameters give an appropriate measure of NDI reliability; it is recommended to establish minimum values for the POD and POR at a specified confidence level.

Author (ESA)

N86-17775# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.

RELIABILITY OF NONDESTRUCTIVE INSPECTION

J. H. Heida 7 Feb. 1985 33 p refs

(NLR-TR-84011-U; B8568528) Avail: NTIS HC A03/MF A01

The probability of detection (POD) of flaws in flawed specimens in nondestructive inspection (NDI) is discussed. Lower bound values of this probability at a given confidence level are calculated. Inspection sample size limits the applicability of statics, so data points are grouped in intervals of flaw size; four interval methods are discussed. An approach for the representation of NDI reliability using linear regression analysis is described. The quadrinomial distribution of the possible outcomes of NDI, with successful and unsuccessful inspections of flawed and unflawed specimens, is discussed. A probability of recognition (POR) is defined for the unflawed specimens. Both POD and POR must be included in a characterization of NDI reliability. It is doubted whether a single parameter gives an appropriate measure of NDI reliability; it is recommended to establish minimum values for both the POD and POR at a specified confidence level. Author (ESA)

N86-17776# National Bureau of Standards, Gaithersburg, Md. Office of Nondestructive Evaluation.

NDE (NON-DESTRUCTIVE EVALUATION) PUBLICATIONS, 1982

L. Mordfin Jun. 1985 37 p

(PB85-244069; NBSIR-85/3183) Avail: NTIS HC A03/MF A01 CSCL 14B

This is the sixth in a series of bibliographies of NBS publications on nondestructive evaluation (NDE). It provides bibliographic citations, with selected abstracts, for 124 publications that appeared in the open literature, primarily during calendar year 1982. A detailed subject index is included as well as information on how copies of many of the publications may be obtained. Author (GRA)

N86-17777# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.

THE USE OF ULTRASONIC WAVE ATTENUATION TO MONITOR POLYMER AND COMPOSITE QUALITY

W. N. Reynolds, L. P. Scudder, and Helen Pressman Jun. 1985 14 p

(AERE-R-11704) Avail: NTIS HC A02/MF A01

Ultrasonic wave attenuation has been measured in a small range of polymeric materials over the frequency range 3.20 MHz, using a new rapid technique. It has been found that a 1% moisture ingress in an epoxy resin produces about a 10% increase in attenuation. Polyurethane additive can be monitored and assayed by the same method. Carbon fiber reinforced epoxys and PEEK show additional scattering with a wider statistical distribution. It is suggested that measurements of this kind could form the basis for monitoring the quality of a wide range of polymeric systems, both filled and unfilled and for detecting the occurrence of various types of defect and degradation. Further investigations would be required to establish the mechanisms involved in the effects observed. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-17778 British Library Lending Div., Boston Spa (England).
VIBRATIONAL STABILITY BEHAVIOUR OF ORTHOTROPIC PLATES IN STEEL ROADS BRIDGES: APPLICATION FOR FINANCIAL SUPPORT OF A RESEARCH PROJECT BY THE ECSC (EUROPEAN COAL AND STEEL COMMUNITY)
25 Sep. 1985 29 p refs Transl. into ENGLISH from West Germany Application (Darmstadt), 28 Jun. 1985
(BLL-Trans-3225-(9057.2451)) Avail: British Library Lending Div., Boston Spa, Engl.

The traffic loads and the stresses induced on steel road bridges were investigated. Actual traffic loads on steel road and railway bridges, and the stresses thereby induced in the bridge structures, to provide better principles for the development of design specifications for steel bridges and for standardizing existing specifications in Europe were compiled. New facts regarding traffic, distributions of the overall weights and axle loads of vehicles, and corresponding stress spectra are presented. Some components of steel bridge structures must withstand a very great number of load fluctuations, particularly the components of orthotropic carriageway slabs. It appears necessary, in design specifications for bridge structures, to include the aspects of operationally confirmed dimensioning to avoid unexpected fatigue damage to load-bearing components, and to avoid unnecessary overdimensioning of such parts. It is essential to make test results available that will permit the vibrational stability characteristic values, also in the range exceeding 2 -1000,000 alternating stresses, to be uniformly defined for the designing of road bridge structures. E.A.K.

N86-17779 Ohio State Univ., Columbus.
CRACK GROWTH IN AN ELASTIC-PRIMARY CREEPING MATERIAL Ph.D. Thesis
Ting-Chieh Chang 1985 198 p
Avail: Univ. Microfilms Order No. DA8510554

The asymptotic stress and strain fields near the tip of a slowly growing crack are derived for elastic-primary creeping materials. Asymptotic analysis based upon a continuum mechanics model, yields the nature of the near tip singular fields for anti-plane shear (Mode 3), plane stress and plane strain (Mode 1). The functional dependence of the crack tip singularity changes at n-p + 3. For n-p < 3, an inverse square root stress singularity takes place which is dependent upon the applied loads and the crack history. The steady state crack growth can not occur in an elastic-primary creeping material in this range. For n-p > 3, a new type of singular field is found for both steady state and nonsteady state crack growth. The problem of a quasistatically growing crack in elastic-primary creeping material is then analyzed for the cases of plane stain Model 1 and anti-plane shear Mode 3 under conditions of small scale yielding.
Dissert. Abstr.

N86-17780 Texas A&M Univ., College Station.
THE MECHANICS OF A NEAR-SURFACE CRACK UNDER UNIFORM PRESSURE OR SHEAR IN A TRANSVERSELY ISOTROPIC MEDIUM: WITH APPLICATIONS TO HYDRAULIC FRACTURE Ph.D. Thesis
George Aristotle Gazonas 1985 209 p
Avail: Univ. Microfilms Order No. DA8517790

The influence of material anisotropy (transverse isotropy) on half-plane surface tilt and displacement fields induced by a near-surface crack under uniform pressure or shear is investigated by solving a series of boundary value problems using: (1) Dual integral Methods, (2) Fourier Transform/Green's Function Methods, and (3) Complex variable Methods. The solutions obtained by the various methods are compared and are found to be in excellent agreement. The complex variable solutions for: (1) the vertical displacements induced by a uniformly pressurized crack oriented parallel to the free-surface of a nearly isotropic half-plane, and (2) the surface tilts induced by a uniformly pressurized crack oriented perpendicular to the free-surface of a nearly isotropic half-plane concur with the solutions of Pollard and Hozhausen (1979), obtained using the Schwarz-Neumann Alternating Methods. It is shown that free-surface effects become negligible for depth to half-crack length ratios greater than four, d/a > 4. Surface tilts are highly nonunique, even in a nearly isotropic medium.
Dissert. Abstr.

N86-17781 South Carolina Univ., Columbia.
THE USE OF ACOUSTICAL CAUSTICS IN FRACTURE MECHANICS Ph.D. Thesis
Ifeanyi Charles Umeagukwu 1985 167 p
Avail: Univ. Microfilms Order No. DA8518058

A new experimental technique based on the acoustical method of caustics for the solution of surface deformation and crack body problems is discussed. The purpose of this research effort is to apply the caustic method to opaque materials, in particular to steel and aluminum specimens. Acoustical caustics technique has a definite advantage over the shadow optical method of caustics. This is because it could be used in reflection to measure the effect of surface deformation, and in transmission to measure both the integrated effect of the internal principal stresses and surface deformations. On the other hand, optical caustics cannot be used in transmission to quantify the cumulative effect of the body principal stresses and surface deformations in a nontransparent material. Dissert. Abstr.

N86-17782 British Library Lending Div., Boston Spa (England).
ESTIMATION OF FLAW SIZE IN ULTRASONIC TESTING OF WELDS IN UNALLOYED AND LOW-ALLOY STEELS Ph.D. Thesis - Eidgenoessische Technische Hochschule, 1984
Xaver Edelmann 7 Nov. 1985 15 p Transl. into ENGLISH from Swiss Thesis
(BLL-Risley-Tr-5229-(9091.9F); ETH-7696) Avail: British Library Lending Division, Boston Spa, Engl.

The combination of differing ultrasonic techniques for flaw size estimation in intergranular stress corrosion cracking (IGSCC) in an austenitic weld is examined. Austenitic compounds place special demands on the ultrasonic technique. This study attempts to illustrate what can be achieved in appropriate use of static and dynamic amplitude evaluation as well as crack tip information. In a newly launched test series, EPRI put the emphasis on crack depth determination using ultrasonics. For a round robin test, suitable test specimens with IGSCC were prepared. Sixteen cuts from welded pipe sections of stainless steel of type 304 were chosen for the investigation. The pipe diameters were between 10' and 28' (254 and 711.2 mm). These samples with properties, dimensions and flaw patterns differing as much as possible were tested as a series, and for the evaluation a clearly defined part was designated as test area. Results indicate that the procedure in flaw size estimation should be characterized by the correct evaluation of the following possibilities: (1) combination of static and dynamic amplitude evaluation; (2) variation of sound field parameters; and (3) comparison of results with different frequencies and angles (if need be variable angle probes). B.W.

N86-17783 British Library Lending Div., Boston Spa (England).
FATIGUE IN A WELDED JOIN MADE BY PULSED MIG WELDING OF A 304 TYPE STAINLESS STEEL
Jose Alfredo Bello Barbosa, Sergio Neves Monteiro, and Carlos Albert Nolasco 7 Nov. 1985 15 p Transl. into ENGLISH of conference paper "Fadiga em Junta Soldada por MIG Pulsado de um Aco Inoxydavel 304" Presented at the 32nd Annual Conference of the ABM, 1977 p 1-16 Conference held at Sao Paulo, Brazil, Jul. 1977
(BLL-Risley-Tr-5233-(9091.9F); PTC-12/77) Avail: British Library Lending Division, Boston Spa, Engl.

This paper deals with analysis of the fatigue strength character-

istics of welded joints of AISI 304 type austenitic stainless steel, by using alternated bending tests. The welding method used was pulsed transfer MIG welding. The behavior of built up bead and ground off bead welds was determined. The possible effect of stress concentrations on the life of a component subject to fatigue was also analyzed. A metallographic study was also carried out to investigate the influence of delta ferrite, formed during welding, on the fatigue properties of the welds. Author

N86-17784 British Library Lending Div., Boston Spa (England).
STATIC AND FATIGUE STRENGTH OF EXPLOSION WELDED PLATES
G. Curti and A. Risitano 7 Nov. 1985 8 p Transl. into ENGLISH from Revista Italiana della Saldatura (Italy), v. 29, no. 1, 1977 p 1-7
(BLL-Risley-Tr-5232-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

The results of preliminary tests carried out in a research program, results, concerning explosive welds of AISI 304 L steel plates are compared with corresponding tests carried out on conventional butt seam welds of the same plates and on plates of base metal. Author

N86-17785 Leeds Univ. (England). Dept. of Mechanical Engineering.
HIGH STRAIN-RATE PROPERTIES OF MATERIALS Progress Report, 31 Dec. 1984
J. L. Sturges 1985 13 p refs
(Contract RARDE-2062/0111)
(BR94080) Avail: Issuing Activity

Commissioning of a test rig for high and intermediate strain rates is summarized. Retreatment of torsion specimens made in a special steel is outlined. The specimens failed to meet hardness values related to a tempering curve. Investigations showed that the failure of the specimens to harden is due to a mass effect, the tempering curve being determined from very small off-cuts. Water quenching produces the required hardness variation, but at a lower level than the original curve. Author (ESA)

N86-17786 Ruhr Univ., Bochum (West Germany). Inst. fuer Mechanik.
DEVELOPMENT AND APPLICATION OF A DIRECT ALGORITHM ADAPTED TO THE DISCRETE FOURIER TRANSFORM FOR THE DETERMINATION OF THE MODAL PARAMETERS OF LINEAR VIBRATION SYSTEMS Thesis [ENTWICKLUNG UND ANWENDUNG EINES AN DIE DISKRETE-FOURIER-TRANSFORMATION ANGEPASSTEN DIREKTEN ALGORITHMUS ZUR BESTIMMUNG DER MODALEN PARAMETER LINEARER SCHWINGUNGSSYSTEME]
Dietmar Bouchard Feb. 1984 130 p refs In GERMAN: ENGLISH summary
(RUB-IFM-MITT-42) Copyright. Avail: Issuing Activity

An algorithm for the identification of vibration parameters using the discrete Fourier transform (DFT) was developed. The algorithm is based on an exact reconstruction of the DFT of an exponentially decreasing harmonic function which describes freely or periodically excited vibrations of a linear system with viscous damping. A special iteration algorithm allows to separate vibrations with closely neighboring eigenfrequencies. Numerical tests show the relationship between the uncertainties of the identified parameters and the disturbances accompanying the measurements. Applications of this algorithm to practical tests on simple models and machines are presented. Author (ESA)

N86-17787# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
WAVE PROPAGATION IN THICK DAMPED LAMINATED PLATES
D. J. Mead and R. Joannides Jan. 1985 88 p refs
(AASU-344) Avail: NTIS HC A05/MF A01

An approximate theory is presented for the plane wave motion in thick multilayered isotropic plates. The wave-speeds, wave-modes and the corresponding wave loss factors when some of the layers are damped were studied. Each layer is assumed to have longitudinal and transverse displacements which vary linearly through the layer thickness. Hamilton's Principle is used to set up corresponding equations of motion in terms of the four displacement coordinates which characterize the displacement of each layer. The whole set of equations so formed for a multiple-layered plate is reduced and simplified by making use of symmetry of the plate, and symmetry or antisymmetry of the wave motion. The single, triple and five-layered configurations are emphasized, and computed results are presented to show how the wave speeds and loss factors vary with wave number of motion. Approximate results are compared with results obtained from the exact theory of a single-layered plate, and with results from previously derived approximate theories. E.A.K.

N86-17788*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
CLOSURE OF FATIGUE CRACKS AT HIGH STRAINS Final Report
N. S. Iyyer and N. E. Dowling Dec. 1985 159 p refs
(Grant NAG3-438)
(NASA-CR-175021; NAS 1.26:175021) Avail: NTIS HC A08/MF A01 CSCL 20K

Experiments were conducted on smooth specimens to study the closure behavior of short cracks at high cyclic strains under completely reversed cycling. Testing procedures and methodology, and closure measurement techniques, are described in detail. The strain levels chosen for the study cover from predominantly elastic to grossly plastic strains. Crack closure measurements are made at different crack lengths. The study reveals that, at high strains, cracks close only as the lowest stress level in the cycle is approached. The crack opening is observed to occur in the compressive part of the loading cycle. The applied stress needed to open a short crack under high strain is found to be less than for cracks under small scale yielding. For increased plastic deformations, the value of sigma sub op/sigma sub max is observed to decrease and approaches the value of R. Comparison of the experimental results with existing analysis is made and indicates the limitations of the small scale yielding approach where gross plastic deformation behavior occurs. Author

N86-17789*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NONLINEAR BENDING-TORSIONAL VIBRATION AND STABILITY OF ROTATING, PRETWISTED, PRECONED BLADES INCLUDING CORIOLIS EFFECTS
K. B. Subrahmanyam (Toledo Univ., Ohio), K. R. V. Kaza, G. V. Brown, and C. Lawrence Jan. 1986 36 p refs Presented at Workshop on Dynamics and Aeroelastic Stability Modeing of Rotor Systems, Atlanta, Ga., 4-5 Dec. 1985; sponsored by Army and Georgia Inst. of Technology, Atlanta
(NASA-TM-87207; NAS 1.15:87207) Avail: NTIS HC A03/MF A01 CSCL 20K

The coupled bending-bending-torsional equations of dynamic motion of rotating, linearly pretwisted blades are derived including large precone, second degree geometric nonlinearities and Coriolis effects. The equations are solved by the Galerkin method and a linear perturbation technique. Accuracy of the present method is verified by comparisons of predicted frequencies and steady state deflections with those from MSC/NASTRAN and from experiments. Parametric results are generated to establish where inclusion of only the second degree geometric nonlinearities is adequate. The nonlinear terms causing torsional divergence in thin blades are identified. The effects of Coriolis terms and several other structurally nonlinear terms are studied, and their relative importance is examined. Author

N86-17790# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
THE DYNAMICS OF MECHANISMS WITH DEFORMABLE LINKS [DYNAMICA VAN MECHANISMEN MET VERVORMBARE SCHAKELS]
A. L. Schwab and K. vanderWerff Nov. 1983 111 p refs Partly

in ENGLISH and DUTCH
(Lab-Rept-758) Avail: NTIS HC A06/MF A01

A general calculation program (DYNAMO) for the analysis of the dynamic behavior of three-dimensional mechanisms with deformable links was developed. The kinematics of spatial mechanisms with multiple degrees of freedom was analyzed. A programming system (SPACAR) for the analysis of the motion of spatial mechanisms, including planar mechanisms, with rigid links was developed. For individual titles, see N86-17791 through N86-17793.

N86-17791# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
THE DYNAMICS OF MECHANISMS WITH DEFORMABLE LINKS [DYNAMICA VAN MECHANISMEN MET VERVORMBARE SCHAKELS]
A. L. Schwab *In its* The Dynamics of Mechanisms with Deformable Links Nov. 1983 44 p In DUTCH (For primary document see N86-17790 08-39)
Avail: NTIS HC A06/MF A01

A finite element program (DYNAMO) for the analysis of the dynamic behavior of three-dimensional mechanisms with deformable links was developed. Characteristics properties of dry Coulomb friction are discussed. Results are reliable, but the calculation time is long, especially for second order transfer functions. The integration method based on the interpolation principle is satisfactory. Discontinuities in the acceleration do not pose problems.
Author (ESA)

N86-17792# Technische Hogeschool, Delft (Netherlands). Dept. of Mechanical Engineering.
FINITE ELEMENT KINEMATIC ANALYSIS OF SPATIAL MECHANISMS
K. vanderWerff *In its* The Dynamics of Mechanisms with Deformable Links Nov. 1983 53 p refs Partly in ENGLISH and DUTCH (For primary document see N86-17790 08-39)
Avail: NTIS HC A06/MF A01

The kinematics of spatial mechanisms with multiple degrees of freedom was analyzed. The position and deformation of each mechanism element are described by position parameters. The rotation of mechanism components is described with Euler parameters. Finite elements to describe the kinematics of spatial mechanisms such as the space truss element, the space beam element, the hinge element, and the lambda element are presented. The general theory describing the motion of a mechanism composed of a number of finite elements assuming that the deformation parameters of all elements can be varied independently is presented. A computer program (SPACAR), based on this theory was developed.
Author (ESA)

N86-17793# Technische Hogeschool, Delft (Netherlands). Computer Aided Design of Mechanisms Group.
THE SPACAR PROGRAM SYSTEM FOR THE ANALYSIS OF THE MOTION OF SPATIAL MECHANISMS. USER MANUAL
K. vanderWerff *In its* The Dynamics of Mechanisms with Deformable Links Nov. 1983 13 p refs (For primary document see N86-17790 08-39)
(Lab-Rept-739) Avail: NTIS HC A06/MF A01

A finite element programming system for the analysis of the motion of spatial mechanisms, including planar mechanisms, with rigid links was developed. The SPACAR program system consists of: definition of the mechanism (topology and geometry), system preparation, and calculation of the transfer functions. Additional calculations have to be defined by the user. The approach is such that flexible link mechanisms can also be treated. Kinematic calculations, as well as dynamic and kinetostatic calculations can be carried out. It must be seen as a skeleton program which forms the basis of the user's application. How the modules of the skeleton program are called and how the necessary input must be prepared are described.
Author (ESA)

N86-17794# Lawrence Livermore National Lab., Calif.
VISCOSITY, GRANULAR-TEMPERATURE AND STRESS CALCULATIONS FOR SHEARING ASSEMBLIES OF INELASTIC, FRICTIONAL DISKS
O. R. Walton and R. L. Braun 25 Jun. 1985 44 p Presented at the 56th Annual Meeting of the Society of Rheology, Blacksburg, Va., 24 Feb. 1985
(Contract W-7405-eng-48)
(DE85-015173; UCRL-91756; CONF-850289-1) Avail: NTIS HC A03/MF A01

Employing nonequilibrium molecular-dynamics methods the effects of two energy loss mechanism on viscosity, stress, and granular-temperature in assemblies of nearly rigid, inelastic, frictional disks undergoing steady-state shearing are calculated. Energy introduced into the system through forced shearing is dissipated by inelastic normal forces or through frictional sliding during collisions resulting in a natural steady-state kinetic energy density (granular-temperature) that depends on the density and shear rate of the assembly and on the friction and inelasticity properties of the disks. The calculations show that both the mean deviatoric particle velocity and the effective viscosity of a system of particles with fixed friction and restitution coefficients increase almost linearly with strain rate. Particles with a velocity-dependent coefficient of restitution show a less rapid increase in both deviatoric velocity and viscosity as strain rate increases. Particles with highly dissipative interactions result in anisotropic pressure and velocity distributions in the assembly, particularly at low densities. At very high densities the pressure also becomes anisotropic due to high contact forces perpendicular to the shearing direction. The mean rotational velocity of the frictional disks is nearly equal to one-half the shear rate. The calculated ratio of shear stress to normal stress varies significantly with density while the ratio of shear stress to total pressure shows much less variation. The inclusion of surface friction (and thus particle rotation) decreases shear stress at low density but increases shear stress under steady shearing at higher densities.
DOE

N86-17795# Oak Ridge National Lab., Tenn. Heavy-Section Steel Technology Program.
DYNAMIC ANALYSES OF A CRACK RUN-ARREST EXPERIMENT IN A NONISOTHERMAL PLATE
B. R. Bass, C. E. Pugh, and H. K. Stamm (Institut fuer Reaktorbauelement Kernforschungszentrum, Karlsruhe, West Germany) Jun. 1985 11 p refs Presented at conference
(Contract DE-AC05-84OR-21400)
(TI85-016420; CONF-850670-22) Avail: NTIS HC A02/MF A01

In crack-arrest studies sponsored by the Heavy-Section Steel Technology (HSST) Program, a primary objective has been to produce fracture toughness data for reactor pressure vessel materials at temperatures approaching the Charpy upper-shelf regime. In these tests, a single-edge crack in a wide-plate is subjected to tensile loading initiates at low temperature and arrests in a region of increased fracture toughness. The gradient in toughness is achieved by applying a linear transverse temperature profile across the plate. The second test in this series for A 533 grade B class 1 steel involves crack initiation in cleavage followed by arrest at a temperature corresponding to Charpy upper-shelf behavior. The plate geometry, the material properties, and the instrumentation are discussed along with conditions and results for this test. Pretest static and elastodynamic analyses are described, and posttest analyses based on actual boundary conditions are shown to compare favorably with the observed run-arrest events.
DOE

N86-17796# Structural Mechanics Associates, Inc., Newport Beach, Calif.
ENGINEERING CHARACTERIZATION OF GROUND MOTION. TASK 2: EFFECTS OF GROUND MOTION CHARACTERISTICS ON STRUCTURAL RESPONSE CONSIDERING LOCALIZED STRUCTURAL NONLINEARITIES AND SOIL-STRUCTURE INTERACTION EFFECTS
R. P. Kennedy, R. H. Kincaid, and S. A. Short Mar. 1985 156 p refs Sponsored in part by Nuclear Regulatory Commission Prepared in cooperation with Woodward-Clyde Consultants, Walnut Creek, Calif.

(TI85-901169; NUREG/CR-3805-Vol-2) Avail: NTIS HC A08/MF A01

A two-task study on the engineering characterization of earthquake ground motion for nuclear power plant design is reported. The objective of this program is to develop recommendations for methods for selecting design response spectra or acceleration time histories to be used to characterize motion at the foundation level of nuclear power plants. Task 1 of the study developed a basis for selecting design response spectra taking into account the charcteristics of free-field ground motion found to be significant in causing structural damage. Task 2 incorporates additional considerations of effects of spatial variations of round motions and soil-structure interaction on foundation motions and structural response. The following results are presented: (1) effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects; (2) empirical data on spatial variations of earthquake ground motions; (3) soil-structure interaction effects on structural response; and (4) summary of conclusions and recommendations based on Tasks 1 and 2 studies. GRA

N86-17797# Sandia National Labs., Albuquerque, N. Mex.
SHOCK RESPONSE SPECTRUM AT LOW FREQUENCIES
D. O. Smallwood 1985 20 p refs Presented at the 56th Shock and Vibration Symposium, Monterey, Calif., 22 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018273; SAND-85-1334C; CONF-8510156-1) Avail: NTIS HC A02/MF A01

This paper shows that for small damping the correct acceleration shock response spectrum will roll off with a slope of 6 dB/octave on a log-log plot. Some other suggestions examined are that the spectrum doesn't roll off at 12 dB/octave, zero offsets cause the spectrum to roll off at a slope different from 12 dB/octave, truncation errors cause the problem, and incorrect algorithms are being used to calculate the spectrum. DOE

N86-17798# California Univ., Berkeley. Lawrence Berkeley Lab.
SLOW CRACK GROWTH: MACROSCOPIC AND MICROSCOPIC ASPECTS
R. O. Ritchie Nov. 1984 74 p refs Presented at the 2nd National Conference on Fracture, Johannesburg, South Africa, 26 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE85-011165; LBL-18631; CONF-851140-1) Avail: NTIS HC A04/MF A01

Modern engineering design against fracture in safety-critical structures generally is based on the concept of defect- or damage-tolerance, where projected life is estimated in terms of the time for an assumed initial defect to propagate to some critical size. Accordingly, from a materials standpoint, increased resistance to failure can be achieved by retarding the sub-critical growth of cracks prior to final failure. In the current paper, an overview is presented of several recent advances in the understanding of the salient mechanisms of such slow crack growth, involving fracture under both monotonic and cyclic loading at ambient and elevated temperatures. DOE

N86-17799# Centro Informazioni Studi Esperienze, Milan (Italy).
CONTRIBUTION TO THE INTERPRETATION OF SLOW STRAIN RATE TECHNIQUE (SSRT) STRAIN RATE EFFECT ON BOILING WATER REACTOR (BWR) AISI 304SS IGSCC
G. Buzzanca, E. Caretta, L. Meini, R. Pascali (Italian Electricity Board), and C. Ronchetti 1984 23 p refs Presented at Conference on Environmentally Sensitive Cracking Problems in Nuclear Installations Containing High Temperature Water, Munich, West Germany, 18-20 Sep. 1984
(Contract ISMAT-200)
(CISE-2604) Avail: NTIS HC A02/MF A01

The effect of strain rate on stress corrosion cracking tests of boiling water reactor steels was assessed. The effect of sensitization, whose degree depends on carbon content and heat treatment is evident at high strain rate values only for high carbon and highly sensitized stainless steel. Less sensitized high carbon steel or lower carbon steel at the maximum possible sensitization show an ultimate tensile strength reduction only at slower strain rates. At the slowest strain rates results tend to reach a common constant value thus reducing the differences due to sensitization. The effects are similar for sensitized stainless steel in the presence of chemical environment with different aggressiveness. Results demonstrate that there are 3 strain rate ranges for the AISI 304SS IGSCC problem. Author (ESA)

N86-17800# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
STRUCTURAL RESPONSES IN A RANDOM ENVIRONMENT [REPONSE DES STRUCTURES A UN ENVIRONNEMENT ALEATOIRE]
Alain Girard Mar. 1985 73 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-932)
(CNES-NT-115) Avail: NTIS HC A04/MF A01

Random vibrations are statistically described and analyzed in the time domain and in the frequency domain. The principles of the determination of the structural response are given. The modal solution is presented, and applied to shaker and reverberating field excitation. To overcome the high frequency limitations of the method a statistical energy analysis is proposed. The use of simplifying assumptions facilitates calculation of the response of relatively complex structures, provided that the appropriate parameters are properly determined. Author (ESA)

N86-17801# Oxford Univ. (England). Dept. of Engineering Science.
MODELING OF THIN-WALLED SHELLS FOR BUCKLING INVESTIGATIONS BY ELECTROPLATING
C. Ruiz, V. K. Thompson, and P. R. Murray 1985 31 p refs Sponsored by SENER, UKAEA, Culham and British Gas
(OUEL-1562/85) Avail: NTIS HC A03/MF A01

The manufacture of accurate models for the study of buckling of thin walled shells by electrodepositing copper onto wax cores is described. Results for complete spherical shells, cylindrical shells of variable thickness with reinforcing rings, and complete toroidal shells with D-shaped cross section are presented. Shell diameters range from 126 to 275 mm with thicknesses between 0.04 and 1 mm. The simplicity of the electrocoating technique with copper anodes and the low cost of the equipment required are emphasized. Other advantages arise from the high accuracy that can be achieved, the absence of residual stresses, and the isotropy of the shell material. Direct scaling from model to full size structure is only possible when both fail in the same manner. This restricts the value of the experiment, which should be combined with mathematical analysis. Author (ESA)

N86-17802# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Mechanik.
STUDY OF PLATE IMPEDANCES
P. Hagedorn and K. Kelkel Paris ESA Apr. 1985 210 p refs
(Contract ESTEC-5683/83/NL-PP(SC))
(ESA-CR(P)-2086) Avail: NTIS HC A10/MF A01

Expressions for impedances of rectangular and circular plates are derived by analytical and semianalytical methods. Physical interpretations of the mathematical formalism used and of the results are given. The impedances obtained are to be used in a distributed element program. It is shown that concentrated moments lead to infinite angular displacements in elastic plates. The concept of reduced multipoint impedance matrix is introduced. The circular plate with free boundary supported at a rigid, circular, central hub is solved in terms of Bessel functions. Results for the circular plate supported excentrically at a single point and the reduced multipoint impedances are given in terms of Bessel functions. The rectangular plate with free boundary leads to a far more complicated problem, for which solutions are given as double series, with good convergence obtained. The impedance expressions given for the rectangular and for the circular plate seem appropriate for use in the computation of the dynamics of composite structures. Author (ESA)

N86-17803# Sartorius G.m.b.H., Goettingen (West Germany).
APPLICATION OF SURFACE ACOUSTIC WAVE RESONATORS TO QUARTZ BENDING BEAMS AS INTEGRATED DILATION RECORDERS IN BALANCES (LOAD CELLS) Final Report, Oct. 1984
Christoph Berg, Matthias Eger, and Wolfgang Riss (Technische Univ., Brunswick) Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985 49 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-058; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10.50

The influence of the stress of a surface acoustic wave resonator substrate on the resonant frequency was investigated with a view to its use as electrical measurement of the bending of a spring and hence as a means to determine the acting force or the weight. Quartz bending beams with surface acoustic wave resonators were designed, manufactured, and tested. The associated electronics were designed. However, it is not possible to achieve a resolution of at least 10,000 digits. Author (ESA)

N86-17804# Technische Hogeschool, Twente (Netherlands). Dept. of Mechanical Engineering.
FREE VIBRATIONS OF FINITE FLEXIBLE SHELLS AND TUBES IN AXIAL FLOW
D. H. vanCampen, P. J. M. vanderHoogt, and L. Hartsuiker 1985 8 p refs
Avail: NTIS HC A02/MF A01

A computational method describing the vibrational behavior of finite circular cylindrical shell and tube arrays subjected to liquid axial flow was developed. The results show a decrease of the eigenfrequencies of the system due to the hydrodynamic forces and coupling effects. Structural instability phenomena caused by axial flow velocity were investigated. Increasing the hydrodynamic coupling, i.e., increasing the number of bodies and decreasing their spacing, provokes instabilities at considerably lower fluid velocities. Author (ESA)

N86-17805# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AUTOMATIC CRACK LENGTH MEASUREMENTS BY THE ELECTRICAL POTENTIAL DROP METHOD WITH COMPUTER CONTROL
A. Burgers and P. D. Kempen 1984 28 p refs
(VTH-LR-309) Avail: NTIS HC A03/MF A01

A method for automatic crack length measurements in fatigue crack propagation tests is described. Using a constant electric current through the specimen, the electric potential drop near the crack and a reference potential drop on the same specimen away from this circle are measured. The ratio of the two potential drops is used for calculating the crack length. This is done by the same computer that controls the fatigue load, which allows fatigue load readjustments dictated by crack length. As a result of the automatic crack length measurements, tests can run overnight without attendance of personnel. Author (ESA)

N86-17806# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN OF HAT-STIFFENED COMPOSITE PANELS UNDER UNIAXIAL COMPRESSION AND SHEAR. MINIMUM MASS OPTIMIZATION BASED ON A SIMPLIFIED THEORY
G. Romeo (Polytecnico di Torino, Italy) 1984 46 p refs Sponsored by Technical Hogeschool, Delft
(VTH-LR-312) Avail: NTIS HC A03/MF A01

Literature on stiffened compression panels was reviewed, and a computer program for the evaluation of minimum-mass hat stiffened panels under uniaxial loads was written. In the analytical studies the mechanical properties of the graphite/epoxy material were considered to be linearly elastic and the lower stresses Young's modulus was used. Since a reduction of up to 20% is possible in compression, the 50% mass-saving derived from these results seems too optimistic. A reduced stress-dependent Young's modulus should be used and the tangent modulus theory applied. Better mass-savings are possible with higher hat height values, but these depend on wing airfoil thickness since the optimal distance from the bending neutral axis is required. Under uniaxial compression, a mass-saving up to 40% compared with test data on aluminum panels is evaluated. The fabrication process did not require complex tooling or a difficult production technique. However, complexity could arise for a correct nondestructive inspection of all parts of the panel, because of the closed stiffeners with inclined surfaces. Author (ESA)

N86-17807# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE EFFECT OF BLUNT NOTCHES AND SAW CUTS ON THE STATIC STRENGTH OF 2024-T3 AND 7075-T6 SHEET MATERIAL
J. Schijve and J. Snijder 1984 21 p refs
(VTH-LR-313) Avail: NTIS HC A02/MF A01

The effect of holes on the static strength of aluminum alloy sheets used in aircraft was tested. Sheet specimens with circular holes and slotted holes to cover a Kt range from 2 to 5, with notch root radius 2 or 5 mm were produced. The effect of the notches on the static net section failure stress is small, involving an average reduction at Kt = 3 of 8% and 1% for 2024-T3 and 7075-T6 respectively. The trends observed can be understood qualitatively from plasticity considerations. For saw cuts, the failure stress corresponds to net section yield for the 2024-T3 alloy, while for 7075-T6 a modified Feddersen diagram represents the results quite well. Author (ESA)

N86-17808# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
RESIDUAL STRENGTH OF BONDED STIFFENED PANELS: PREDICTION AND EXPERIMENTAL VERIFICATION
H. Vlieger May 1983 104 p refs
(Contract NIVR-312.2-1746)
(NLR-TR-83066-U; B8568530) Avail: NTIS HC A06/MF A01

Residual strength calculations on cracked panel configurations of various designs and provided with bonded stiffeners were carried out using the computer program BOND. Results are compared with residual strength tests on similar panels. Calculation results generally compare well but can be slightly unconservative, depending on panel configuration and material combination of sheet and stiffeners. The computer program is described. Author (ESA)

N86-17809# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
FATIGUE RATED FASTENER SYSTEMS IN ALUMINUM ALLOY STRUCTURAL JOINTS
H. H. vanderLinden 14 Jul. 1983 29 p refs Presented at 12th ICAF Symposium, Toulouse, France, 25-27 May 1983 Sponsored by Royal Netherlands Air Force Directorate of Material
(Contract NIVR-1892)
(NLR-MP-83045-U; B8569323) Avail: NTIS HC A03/MF A01

A fatigue rated fastener systems test program for aircraft is described. The program assesses fatigue lives of fastener systems in combination with hole preparation techniques using different joint geometries. Establishment of cost figures in relation to the fatigue performance and the development of a reference datum for the comparison of test results produced in different countries are included. For high load transfer single shear joints, joint designs and their double shear equivalent designs are compared. Evaluation includes testing under FALSTAFF loading and the measurement of load transfer and secondary bending using standard procedures. Fatigue test results of low load transfer, medium load transfer 1 1/2 dogbone, and high load transfer double shear specimens are also included. Procedures for measuring load transfer and secondary bending are illustrated using 1 1/2 dogbone specimens. Author (ESA)

N86-17810# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
THE ROTATING DISK AND THE YIELD CONDITIONS OF

TRESCA AND VON MISES [DE DRAAIENDE SCMYF EN HET VLOEICRITERIUM VAN TRESCA EN VON MISES]
A. L. Schwab Nov. 1983 39 p refs Partly in DUTCH and ENGLISH
(Lab-Rept-759) Avail: NTIS HC A03/MF A01

The yield conditions of Tresca and von Mises were applied to a rotating disk with constant thickness made of an isotropic elastic, perfectly plastic material. The application of the Tresca yield criterion reveals the difficulty that in a two dimensional treatment the plastic deformation is not compatible with a continuous radial displacement. It is shown that this difficulty does not occur when the von Mises criterion is applied. Author (ESA)

N86-17811# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
A DOUBLE-CURVED TRIANGULAR SHELL ELEMENT ALLOWING THE ANALYSIS OF SHELL PROBLEMS IN THE PLASTIC DOMAIN [EEN DUBBEL GEKROMD DRIEHOEKIG SCHAALELEMENT WAARMEE SCHAALVRAAGSTUKKEN IN HET PLASTISCHE GEBIED KUNNEN WORDEN GEANALYSEERD]
H. A. Lupker Sep. 1983 103 p refs In DUTCH
(Lab-Rept-761) Avail: NTIS HC A06/MF A01

A computer program for shell problems in the plastic domain whereby nonlinearity is reglected was developed. The starting point was the program for the linear-elastic Besseling-Ernst-Diepstraten (BED) finite element, and the development was based on displacement vectors and deformation tensors in terms of Cartesian components. The constitutive equations for elastic and plastic deformations were derived. The linearized elasticity problem and the plasticity problem for a shell were treated. A numerical verification is presented. The most important computer programs are enclosed. The program for the BED-elements, based on the incremental self-correcting solution procedure is suitable for plastic plate and shell problems when geometric nonlinearity is neglected. Author (ESA)

N86-17812# Centre Technique des Industries Mecaniques, St. Etienne (France).
ASSEMBLING WITH USE OF PERMANENT DEFORMATION Final Report [SERTISSAGE]
J. Chalier 3 Oct. 1984 12 p refs In FRENCH
(CETIM-13-N-283) Avail: NTIS HC A02/MF A01

Permanent joints such as riveted joints, made using plastic deformation of one of the elements, are studied in order to provide a user's guide useful to the designer to describe the operation. The principles and application of several types of joining procedures are examined. Author (ESA)

N86-17813# Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Engins Tactiques.
NUMERICAL SIMULATION OF IMPACT TESTS AND COMPARISON OF BEHAVIOR LAWS [SIMULATION NUMERIQUE D'ESSAIS D'IMPACT ET COMPARAISON DE LOIS DE COMPORTEMENT]
Dominique Bois and Alain Grave 1985 14 p refs In FRENCH; ENGLISH summary
(SNIAS-852-320-101) Avail: NTIS HC A02/MF A01

A titanium alloy and two steels were impact tested. Johnson-Cook, Lindholn, and Bodner-Partom viscoplastic constitutive equations were tried as models using a Hemp code. The material constants are determined for each material on the results of Hopkinson bar tests. The models are evaluated by comparing computed results with data from Taylor tests. It is shown that the Bodner-Partom model is poorly adapted to deformation velocities larger than 10,000 per sec. The Johnson isotherm model and the Lindholn model are in good agreement with experimental data. Author (ESA)

N86-17394# Morton Thiokol, Brigham City, Utah.
USE OF PEEL VALUES IN STRUCTURAL ANALYSIS
S. J. Bennett and A. W. MacBeth *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 137-144 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

N86-17412# Arde, Inc., Mahwah, N.J.
REPORT ON KEVLAR -49 COMPOSITE PRESSURE VESSEL SAFETY TECHNOLOGY PROGRAM
D. Gleich *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 321-332 refs (For primary document see N86-17380 08-20)
(Contract F08606-84-C-0029)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-17814*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CNPq/INPE-LANDSAT SYSTEM Report of Activities, 1 Oct. 1984 - 31 Aug. 1985
Jose Luiz deBarrosAguirre Sep. 1985 28 p Presented at the LANDSAT Ground Station Operators Working Group and LGSOWG Data Distribution and Marketing Working Group meetings, Washington, D.C., Sep. 1985 Sponsored by NASA ERTS
(E86-10019; NASA-CR-175884; NAS 1.26:175884; INPE-3635-PRE/812) Avail: NTIS HC A03/MF A01 CSCL 05B

The current status of the Brazilian LANDSAT facilities operated by Instituto de Pesquisas Espaciais (INPE) and the results achieved during the period from October 1, 1984 to August 31, 1985 are presented. INPE's Receiving Station at Cuiaba, MT, operates normally the two tracking and receiving systems it has installed, the old one (1973) for Band S and the new one (February 1983) for dual S- and X-band. Both MSS and TM recording capabilities are functional. Support to the NASA Backup Plan for MSS data also remains active. Routine recordings are being made for LANDSAT-5 only, for both MSS and TM. Originally, MSS was recorded over the full acquisition range. However, since December, 1984, due to further reduction of operational expenses, both instruments are being recorded over Brazilian territory only. Author

N86-17815*# Murray State Univ., Ky. Mid-America Remote Sensing Center.
DETERMINATION OF THE UTILITY OF REMOTE SENSING DATA FOR LAND USE/COVER ANALYSIS IN THE LOWER APPALACHIA REGION: ASSESSING THE UTILITY OF REMOTE SENSING DATA FOR ARCHEOLOGICAL SITE RECOGNITION Final Report
N. V. Weber 15 Aug. 1983 48 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS13-200)
(E86-10021; NASA-CR-176435; NAS 1.26:176435) Avail: NTIS HC A03/MF A01 CSCL 05B

Thematic Mapper Simulator (TMS) data were gathered by NASA/ERL over a portion of the lower Ohio River and the middle Mississippi River valleys on April 11, 1982. CIR imagery accompanied the 10 and 30 meter resolution TMS data sets. This area is somewhat unique archeologically as there exists a

concentration of sites with major features such as mounds, earthworks, and villages. It was the primary purpose of this study to determine the utility of TMS data in identifying signatures which are distinctly archeological. TMS data were processed using the NASA/ERL software package ELAS. No signatures that were distinctly archeological were detected, due in large part to the complexity of the land cover and land use practices. However, as more sophisticated classification techniques were employed, the classes which were related to archeological features were narrowed. TMS data could certainly be of assistance to a trained archeologist/interpreter in narrowing an area which has to be field-surveyed as anomalous features can be recognized within a particular environmental context. Author

N86-17816*# Arizona Univ., Tucson. Optical Sciences Center.
SPECTRORADIOMETRIC CALIBRATION OF THE THEMATIC MAPPER AND MULTISPECTRAL SCANNER SYSTEM Quarterly Report, 1 Jun. - 31 Aug. 1985
Philip N. Slater and James M. Palmer, Principal Investigators 30 Sep. 1985 18 p ERTS
(Contract NAS5-27832)
(E86-10022; NASA-CR-175861; NAS 1.26:175861; QR-11) Avail: NTIS HC A02/MF A01 CSCL 08B

The eleventh quarterly report on Spectroradiometric Calibration of the Thematic Mapper (Contract NAS5-27832) discusses calibrations made at White Sands on 24 May 1985. An attempt is made to standardize test results. Critical values used in the final steps of the data reduction and the comparison of the results of the pre-flight and internal calibration (IC) data are summarized. F.M.R.

N86-17817*# National Aeronautics and Space Administration, Washington, D.C.
SATELLITE REMOTE SENSING FOR ICE SHEET RESEARCH
R. H. Thomas, R. A. Bindschadler (NASA, Goddard Space Flight Center, Greenbelt, Md.), R. L. Cameron (NSF, Washington, D.C.), F. D. Carsey (JPL, Pasadena, Calif.), B. Holt (JPL, Pasadena, Calif.), T. J. Hughes (Maine Univ.), C. W. M. Swithinbank (British Antarctic Survey, Cambridge, England), I. M. Whillans (Ohio State Univ.), and H. J. Zwally (NASA, Goddard Space Flight Center, Greenbelt, Md.) Nov. 1985 40 p refs Original contains color imagery. Original photographs may be purchased from the EROS Data Center, Sioux Falls, S.D. 57187 ERTS
(E86-10024; NASA-TM-86233; Rept-85F0298; NAS 1.15:86233) Avail: NTIS HC A03/MF A01 CSCL 08L

Potential research applications of satellite data over the terrestrial ice sheets of Greenland and Antarctica are assessed and actions required to ensure acquisition of relevant data and appropriate processing to a form suitable for research purposes are recommended. Relevant data include high-resolution visible and SAR imagery, infrared, passive-microwave and scatterometer measurements, and surface topography information from laser and radar altimeters. Author

N86-17818# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
CONTRIBUTIONS TO GEODESY, PHOTOGRAMMETRY, AND CARTOGRAPHY, SERIES 2
1985 180 p refs Original contains color illustrations
(ISSN-0469-4244) Avail: NTIS HC A09/MF A01

A system of computer programs for an astrogravimetric geoid determination is presented. Integration of remote sensing data and cartographic data bases into a land information system is discussed. For individual titles, see N86-17819 through N86-17820.

N86-17819# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A SYSTEM OF COMPUTER PROGRAMS FOR AN ASTROGRAVIMETRIC GEOID DETERMINATION
Juergen Brennecke *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2 1985 p 5-161 refs (For primary document see N86-17818 08-43)
Avail: NTIS HC A09/MF A01

Computer programs for determination of regional geoid surfaces using kernel function approximation and least squares adjustment are presented. Though the programs, written in FORTRAN 77, have a wider range of applications and options, the primary modification for astrogravimetric geoid computation including pre and postprocessing of data and results is stressed. Author (ESA)

N86-17820# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
INTEGRATION OF REMOTE SENSING DATA AND CARTOGRAPHIC DATA BASES INTO A LAND INFORMATION SYSTEM
Wolfgang Goepfert *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2 1985 p 163-173 refs Original contains color illustrations (For primary document see N86-17818 08-43)
Avail: NTIS HC A09/MF A01

The need to assess simultaneously alphanumeric, vector, and raster (image) data for land information system applications is emphasized. The use of raster processing techniques is stressed. The data bases available and the land information system used at the German Geodesy Institute (Frankfurt) are presented. Applications are discussed and color examples are enclosed. Author (ESA)

N86-17821# Naval Ocean Systems Center, San Diego, Calif.
GRAPS: GRAPHICAL PLOTTING SYSTEM Final Report
R. T. Laird Jul. 1985 156 p
(AD-A159808; NOSC/TD-820) Avail: NTIS HC A08/MF A01 CSCL 09/2

This document describes operational and design aspects of the GRAphical Plotting System (GRAPS). It can be used both as an introductory guide to the system and as a reference for the experienced user. The GRAPS is a computer program that displays and plots graphs of various types produced on a computer. In addition, GRAPS allows a user to configure and save certain operational parameters of the system. The GRAPS can also be used to edit the text or label the data of graphs. This manual covers all aspects of GRAPS (GRAphical Plotting System). It will aid those interested only in the program's operation as well as those concerned with the program's design. The objective of this project was to implement, on a microcomputer, polar, Smith, linear-linear, linear-log, and log-log charts by using the BASIC language with multiple windows for display of numerical electromagnetics code (NEC) results. In addition, a PC-family screen display, matrix printer, and Hewlett-Packard (HP) pen plotter display of the above graph types were provided. GRA

N86-17822# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
SOUTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 3: PLATES Final Report
Aug. 1985 96 p
(Contract DE-AC02-83CH-10139)
(DE86-000416; DOE/CH-6(3)-Final) Avail: NTIS HC A05/MF A01

An index map; as well as maps of faults and ground acceleration; rock and mineral resources; and drainage basin and groundwater discharge zones. DOE

N86-17823# University Coll., London (England). Mullard Space Science Lab.
APPLICATIONS AND SCIENTIFIC USES OF ERS-1 RADAR ALTIMETER DATA Final Report
C. G. Rapley, H. D. Griffiths, V. A. Squire (Cambridge Univ.), J. G. Olliver (Oxford Univ.), A. R. Birks (Science and Engineering Research Council, Chilton, England), A. P. R. Cooper (Cambridge Univ.), A. M. Cowan (Cambridge Univ.), D. J. Drewry (Cambridge Univ.), M. R. Gorman (Cambridge Univ.), M. Guzkowska (Oxford Univ.) et al Paris ESA Feb. 1985 276 p refs
(Contract ESTEC-5684/83/NL-BI)
(ESA-CR(P)-2084) Avail: NTIS HC A13/MF A01

Applications of the ERS-1 pulse-limited radar altimeter dedi-

cated to observations of oceans and ice are discussed. Areas in which the ERS-1 altimeter is likely to be most effective are indicated. Status of the data analysis techniques and the limitations imposed by the design of the altimeter system are described. A concept for the use of altimeter data from lakes for climate research, and work on the altimetry of coastal regions are summarized. Author (ESA)

N86-17824# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
THE GRAL GRAPHIC SYSTEM FOR SITUATIONAL MAPS
Carl-Eric Hedin and Hans Marmolin Apr. 1985 43 p refs In SWEDISH; ENGLISH summary
(FOA-C-50007-H2; ISSN-0347-7665) Avail: NTIS HC A05/MF A01

A computerized presentation of situational maps built up from background information (land and water), static overlay information (such as roads and towns), and dynamic information depending on the situation is described. The techniques used are reviewed, e.g., image cards, run-length coded cards, coordinate transformation (image to page, page to viewport, and viewport to screen transformations). The low level routines used to build the system are outlined and the way to adapt the data for VAX 750 computer and VS11 storage is given. Author (ESA)

N86-17825# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
STUDY OF A LAND USE OF SYNTHETIC APERTURE RADAR, EXECUTIVE SUMMARY
Paris ESA Sep. 1984 13 p 2 Vol.
(Contract ESTEC-5778/83/NL-MS)
(ESA-CR(P)-2067-Vol-1) Avail: NTIS HC A02/MF A01

Characteristics of a SAR satellite and data interpretation system for land-use monitoring in Europe were investigated. Empirical data and surface and volume scattering theories do not allow clear definition of satellite parameters, due to lack of comprehensive datasets. Human and computer analysis are compared. Computer implementation of surface scattering models and a volume scattering model is described, and results of parametric and time-development studies are presented. User-defined requirements for a land use SAR are described. Criteria for manual interpretation of images are defined. Machine measures of texture are applied to SAR 580 data. Results indicate that human and machine estimates of texture differ because of speckle and that for crops, texture measures provide no more information than the mean backscatter. Image comparisons based on color compositing of smoothed and unsmoothed images are described, and the effects of filters compared. The methods are applied to multifrequency and multitemporal data. Author (ESA)

N86-17826# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
STUDY OF A LAND USE OF SYNTHETIC APERTURE RADAR. VOLUME 1: MAIN REPORT Final Report
Paris ESA Sep. 1984 196 p refs 2 Vol.
(Contract ESTEC-5778/83/NL-MS)
(ESA-CR(P)-2067-Vol-2) Avail: NTIS HC A09/MF A01

Characteristics of a SAR satellite and data interpretation system for land-use monitoring in Europe were investigated. Empirical data and surface and volume scattering theories do not allow clear definition of satellite parameters, due to lack of comprehensive datasets. Human and computer analysis are compared. Computer implementation of surface scattering models and a volume scattering model is described, and results of parametric and time-development studies are presented. User-defined requirements for a land use SAR are described. Criteria for manual interpretation of images are defined. Machine measures of texture are applied to SAR 580 data. Results indicate that human and machine estimates of texture differ because of speckle and that for crops, texture measures provide no more information than the mean backscatter. Image comparisons based on color compositing of smoothed and unsmoothed images are described, and the effects of filters compared. The methods are applied to multifrequency and multitemporal data. Author (ESA)

N86-17827# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Apparate.
DEVELOPMENT OF SCANNER DIGITAL IMAGE ACQUISITION FOR PHOTOGRAMMETRY [DIE ENTWICKLUNG DER ABTASTENDEN, DIGITALEN BILDAUFNAHME FUER DIE PHOTOGRAMMETRIE]
O. Hofmann 1985 17 p refs In GERMAN Presented at 70th Geburtstages von Professor Helmut Schmid, Zurich
(MBB-UA-876/85) Avail: NTIS HC A02/MF A01

A digital photogrammetric system (DPS) for geometrical assessment of pushbroom acquisition with a triple strip line camera, and for assessment of optomechanical, infrared and microwave scanners was developed. The strip model can be reconstructed using DPS with the image data alone, without external data, due to a geometrically accurate digital recording of the image point coordinates for each image point for computerized or visual image point identification. A stereo display panel is necessary for interactive correlation support, interpretation, and situation assessments. Author (ESA)

N86-17828# Rijkswaterstaat, The Hague (Netherlands). Meetkundige Dienst.
GEOMETRIC CORRECTION OF REMOTE SENSING IMAGES BY MEANS OF GROUND CONTROL POINTS [GEOMETRISCHE CORRECTIE VAN REMOTE SENSING BEELDEN MET BEHULP VAN GROUND CONTROL POINTS]
L. M. M. Veugen Nov. 1984 59 p refs In DUTCH
(MDLK-R-8429) Avail: NTIS HC A04/MF A01

Remote sensing images were geometrically corrected using a bivariate correction function method based on polynomials. A polynomial is built up from a linear combination of orthogonal polynomials, estimating unknown parameters by Ground Control Points (GCPs). Using this set-up, coefficients of the two polynomials (line and pixel number) are easily estimated, interpretation of significant polynomial terms is simplified, and statistical magnitudes are cleared up. To investigate the impact of number and position of the GCPs on the accuracy, an adjustment algorithm, statistical test magnitudes, and isoline plots were developed. Using simulation and a case study, the model is verified. Correction accuracy shows a high degree of robustness, provided that the GCPs are well distributed over the area. Author (ESA)

N86-17829# Rijkswaterstaat, The Hague (Netherlands). Meetkundige Dienst.
ANALYSIS OF THE RADIOMETRIC RELATION BETWEEN FALSE COLOR AERIAL PHOTOGRAPHS AND MULTISPECTRAL SCANNING (MSS) IMAGES [ANALYSE VAN DE RADIOMETRISCHE RELATIE TUSSEN FALSE COLOUR LUCHTFOTO'S EN MSS-BEELDEN]
Christina Meulstee, Hein vanStokkom, and Tis Veugen Dec. 1983 30 p refs In DUTCH
(MDLK-R-8337) Avail: NTIS HC A03/MF A01

The radiometric relation between color densities of color infrared aerial photographs and the radiation values of simultaneously taken multispectral scanner (MSS) images is analyzed. As aerial photographs possess good geometric, but relatively bad radiometric characteristics, while MSS images present the reverse, combination possibilities of reciprocal completion are investigated. Using a transmission densitometer with a 3 mm aperture, small areas of 1:2400 scale aerial photographs, are measured. Average radiation values/pixel of the analogous 49 pixel areas on the MSS images were calculated in the 550 to 600, 650 to 700, and 800 to 890 nm bands. The relation between photographs and images is examined for the nadir-point and using these data, for the scan direction, and at right and 45 deg angles to the scan direction. Information about film and development parameters, lens light incidence, and the angle dependent reflection of objects is obtained. Author (ESA)

N86-17830# International Training Centre for Aerial Survey, Enschede (Netherlands).
[ACTIVITIES REPORT IN REMOTE SENSING TRAINING] Annual Report, 1983
1983 36 p refs
Avail: NTIS HC A03/MF A01

International cooperation in training and research in photogrammetry; aerial photography; cartography; land resource surveys and rural development; Earth resources surveys; and urban surveys and human settlements analysis are described. Author (ESA)

N86-17831# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
HYDROLOGICAL DESCRIPTION OF A STUDY AREA AROUND PUMP STATION 'T KLOOSTER (THE NETHERLANDS); APPLICATION OF HYDROLOGICAL MODELS AND REMOTE SENSING [HYDROLOGISCHE BESCHRIJVING VAN EEN STUDIEGEBIED ROND HET POMPSTATION'T KLOOSTER; TOEPASSING VAN HYDROLOGISCHE MODELLEN EN REMOTE SENSING]
H. A. M. Thunnissen Jun. 1984 90 p refs In DUTCH
(Nota-1542) Avail: NTIS HC A05/MF A01

A one and three-dimensional model describing the (region-bound) hydrological condition of a gently undulating sandy landscape covered by grass and corn, was compared with daily crop evapotranspirations, derived from remote sensing data. Liquid transport in an unsaturated and saturated zone and actual evaporation of one place (and an area), was simulated. In 144 rectangles (25 ha) the water balance was determined. Using measured hydraulic potentials, and ground-water levels, results were tested. Crop-height dependent relations between daily crop evapotranspirations and crop-temperature increases with regard to potential evapotranspiration temperature, were mapped. Increases and crop heights were derived from thermal images, false color photographs, and field measurements. Thermal images are apt to test one-dimensional models; model calculations can determine if thermal image observed evapotranspiration reductions are due to ground water withdrawal. Author (ESA)

N86-17832# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
SIMPLE METHOD FOR THE DETERMINATION OF REGIONAL DAILY EVAPOTRANSPIRATION OF CROPS USING REMOTE SENSING [EENVOUDIGE METHODE VOOR DE BEPALING VAN DE REGIONALE DAGVERDAMPING VAN EEN GEWAS MET REMOTE SENSING]
H. A. M. Thunnissen Oct. 1984 43 p refs In DUTCH Original contains color illustrations
(Nota-1580) Avail: NTIS HC A03/MF A01

A relation between actual daily evapotranspiration and potential daily evapotranspiration and differences in crop temperatures (using the potential evapotranspiration temperature as reference), measured at noon, was derived. With this method, crop temperature differences derived from thermal images can be transformed directly into daily evapotranspiration differences. The TEGRA mathematical model for deriving daily evapotranspiration from the momentary one is discussed. The utilization of simple linear relations was investigated. Using TEGRA, a sensitivity analysis for crop, meteorological, and soil physical parameters was carried out. Using standard relations between relative daily evapotranspiration and crop heating, the thermal image was automatically transformed into an evapotranspiration map for high and medium high grassland and corn. Author (ESA)

N86-17833# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands). 01Hesen, H. W. M.
STUDY OF EFFECTS OF PUMP STATION OLDEN EIBERGEN (NETHERLANDS) ON AGRICULTURE USING REMOTE SENSING AND HYDROLOGICAL MODELS [BESTUDERING VAN EFFECTEN VAN HET POMPSTATION OLDEN EIBERGEN OP DE LANDBOUW MET REMOTE SENSING EN HYDROLOGISCHE MODELLEN]
Jul. 1984 86 p refs In DUTCH Original contains color illustrations
(Nota-1544) Avail: NTIS HC A05/MF A01

Utilization possibilities of remote sensing images for drought-damage application purposes in a shelving sandy area covered by grass and corn, were investigated; the impact of ground water withdrawal by the pump station was studied. False color photographs were used to define crop-species and quality. Using simulation to interpret thermal images, the relation between crop-temperature and daily evapotranspiration was determined and transformed into a evapotranspiration reduction map. Field measurements were used to determine crop height and coverage. The model was compared with a water balance. Comparing different parcels, pump station impact was determined. For corn, image calculations show good agreement with water balance results. For large-scale groundwater withdrawal, a rough indication of drought-damage is possible (depending on meteorological factors).
Author (ESA)

N86-17834# Geological Survey, Oklahoma City, Okla. Water Resources Div.
WATER RESOURCES DATA FOR OKLAHOMA, WATER YEAR 1983 Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
L. D. Hauth, J. K. Kurklin, and D. M. Walters Feb. 1985 277 p
(PB85-236289; USGS/WRD/HD-85/217; USGS/WDR/OK-83/1)
Avail: NTIS HC A13/MF A01 CSCL 08H

Water resources data for the 1983 water year for Oklahoma consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of streams; stage, contents, and water quality of lakes or reservoirs. This report contains discharge records for 117 gaging stations; stage and contents for 27 lakes or reservoirs; water quality for 39 gaging stations and 3 lakes. Also included are 39 crest-stage partial-record stations and 3 low-flow stations. Author (GRA)

N86-17835# Geological Survey, Lansing, Mich. Water Resources Div.
WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
J. B. Miller, J. L. Oberg, and T. Sieger May 1985 289 p
(PB85-237741; USGS/WRD/HD-85/229; USGS/WDR/MI-84/1)
Avail: NTIS HC A13/MF A01 CSCL 08H

Water resources data for the 1984 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. The report contains discharge records for 142 gaging stations; stage only records for 2 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 27 continuous-record stations; and water levels for 53 observation wells. Also included are 56 crest-stage partial-record stations and 22 low-flow partial-record stations. Author (GRA)

N86-17836# Geological Survey, Richmond Va. Water Resources Div.
WATER RESOURCES DATA FOR VIRGINIA WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
B. J. Prugh, F. J. Easton, and D. D. Lynch 1985 420 p
(PB85-242105; USGS/WDR/VA-84/1; USGS/WRD/HD-85/226)
Avail: NTIS HC A16/MF A01 CSCL 08H

Water resources data for the 1984 water year for Virginia consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground-water wells. This volume contains records for water discharge at 192 gaging stations; stage only at 1 gaging station; stage and contents at 10 lakes and reservoirs; water quality at 43 gaging stations and 5 wells; and water levels at 56 observation wells. Also included are data for 78 crest-stage partial-record stations. Author (GRA)

N86-17837# Geological Survey, Harrisburg, Pa.
WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1984. VOLUME 3: OHIO RIVER AND ST. LAWRENCE RIVER BASINS Annual Report, 1 Oct. 1983 - 30 Sep. 1984
J. B. Lescinsky, M. B. Coll, and R. W. Siwicki Jul. 1985 218 p

Prepared in cooperation with Pennsylvania Dept. of Environmental Resources, Harrisburg
(PB85-239606; USGS/WRD/HD-85/228; USGS/WDR/PA-84-3)
Avail: NTIS HC A10/MF A01 CSCL 08H

Water resources data for the 1984 water year for Pennsylvania consists of records discharge and water quality of streams; elevation and contents of lakes and reservoirs; and water levels of ground-water wells. Records for water discharge at 83 gaging stations; elevations and contents at 3 lakes and reservoirs; and water levels at 39 observation wells are included. Data for 3 crest-stage, 5 low-flow stations, 50 water quality and 85 ground water-quality partial record stations are presented. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-17838 Technische Hogeschool, Twente (Netherlands). Windmill Group.
[ACTIVITIES REPORT IN WINDMILL RESEARCH] Annual Report, 1982
1983 26 p refs
(WM-068) Copyright. Avail: Issuing Activity

Wind energy utilization research in the Netherlands is summarized. Cooperation with developing nations, notably Sri Lanka and Cape Verde, and the status of windpowered generators and pumps under development are described. Author (ESA)

N86-17839*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE PHOTOVOLTAIC RESEARCH AND TECHNOLOGY 1985: HIGH EFFICIENCY, SPACE ENVIRONMENT, AND ARRAY TECHNOLOGY
1985 282 p refs Conference held in Cleveland, Ohio, 30 Apr. - 2 May 1985
(NASA-CP-2408; E-2706; NAS 1.55:2408) Avail: NTIS HC A13/MF A01 CSCL 10A

The seventh NASA Conference on Space Photovoltaic Research and Technology was held at NASA Lewis Research Center, Cleveland, Ohio, from 30 April until 2 May 1985. Its purpose was to assess the progress made, the problems remaining, and future strategy for space photovoltaic research. Particular emphasis was placed on high efficiency, space environment, and array technology. For individual titles, see N86-17840 through N86-17872.

N86-17840*# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero Propulsion Lab.
FUTURE AIR FORCE SPACE POWER NEEDS
Joseph F. Wise *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 17-21 ref (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The requirements for future power for AF satellite mission vehicles, fall into two categories. The first category is in the 1 to 50 kW range for missions of a continuous nature such as communication, navigation, surveillance, data relay and meteorology. The second category is in the multi-megawatt range for either continuous or burst power durations and are for other than solar power sources. Requirements for longer life and survivability in varying degrees are there for all systems. While the power levels do not appear difficult to achieve in view of the large array developments pursued by NASA Space Station technology, the other military requirements are very challenging and continue to be system drivers. The development of solar cells arrays should be in conjunction with other power supply technologies such as regulation and control components and energy storage subsystems. Author

N86-17841*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
OVERVIEW OF SERI'S HIGH EFFICIENCY SOLAR CELL RESEARCH
John P. Benner, Lee A. Cole, and Cecile M. Leboeuf *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 23-26 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The bulk of the research efforts supported by the Solar Energy Research Institute (SERI) High Efficiency Concepts area has been directed towards establishing the feasibility of achieving very high efficiencies, 30% for concentrator and more than 20% for thin film flat plate, in solar cell designs which could possibly be produced competitively. The research has accomplished a great deal during the past two years. Even though the desired performance levels have not yet been demonstrated, based on the recent progress, a greater portion of the terrestrial photovoltaics community believes that these efficiencies are attainable. The program will now allocate a larger portion of resources to low cost, large area deposition technology. The program is currently shifting greater emphasis on to the study of crystal growth in order to provide the understanding and tools needed to design a large area process. Author

N86-17842*# Spire Corp., Bedford, Mass.
FURTHER RESEARCH ON HIGH OPEN CIRCUIT VOLTAGE IN SILICON SOLAR CELLS
M. B. Spitzer and C. J. Keavney *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 27-39 refs Sponsored by part by DOE (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The results of a new research on the use of controlled dopant profiles and oxide passivation to achieve high open circuit voltage V sub oc in silicon solar cells is presented. Ion implantation has been used to obtain nearly optimal values of surface dopant concentration. The concentrations are selected so as to minimize heavy doping effects and thereby provide both high blue response and high V sub oc ion implantation technique has been successfully applied to fabrication of both n-type and p-type emitters. V sub oc of up to 660 mV is reported and AMO efficiency of 16.1% has been obtained. Author

N86-17843*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GALLIUM ARSENIDE SOLAR CELL EFFICIENCY: PROBLEMS AND POTENTIAL
V. G. Weizer and M. P. Godlewski *In its* Space Photovoltaic Research and Technology 1985 1985 p 41-50 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Under ideal conditions the GaAs solar cell should be able to operate at an AMO efficiency exceeding 27 percent, whereas to date the best measured efficiencies barely exceed 19 percent. Of more concern is the fact that there has been no improvement in the past half decade, despite the expenditure of considerable effort. State-of-the-art GaAs efficiency is analyzed in an attempt to determine the feasibility of improving on the status quo. The possible gains to be had in the planar cell. An attempt is also made to predict the efficiency levels that could be achieved with a grating geometry. Both the N-base and the P-base BaAs cells in their planar configurations have the potential to operate at AMO efficiencies between 23 and 24 percent. For the former the enabling technology is essentially in hand, while for the latter the problem of passivating the emitter surface remains to be solved. In the dot grating configuration, P-base efficiencies approaching 26 percent are possible with minor improvements in existing technology. N-base grating cell efficiencies comparable to those

predicted for the P-base cell are achievable if the N surface can be sufficiently passivated. Author

N86-17844*# Delaware Univ., Newark.
N/P GaAs CONCENTRATOR SOLAR CELLS WITH AN IMPROVED GRID AND BUSHBAR CONTACT DESIGN
Gregory C. DeSalvo, Ervin H. Mueller, and Allen M. Barnett *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 51-59 refs (For primary document see N86-17839 08-44)
(Grant NAG3-422)
Avail: NTIS HC A13/MF A01 CSCL 10A

The major requirements for a solar cell used in space applications are high efficiency at AMO irradiance and resistance to high energy radiation. Gallium arsenide, with a band gap of 1.43 eV, is one of the most efficient sunlight to electricity converters (25%) when the the simple diode model is used to calculate efficiencies at AMO irradiance, GaAs solar cells are more radiation resistant than silicon solar cells and the N/P GaAs device has been reported to be more radiation resistant than similar P/N solar cells. This higher resistance is probably due to the fact that only 37% of the current is generated in the top N layer of the N/P cell compared to 69% in the top layer of a P/N solar cell. This top layer of the cell is most affected by radiation. It has also been theoretically calculated that the optimized N/P device will prove to have a higher efficiency than a similar P/N device. The use of a GaP window layer on a GaAs solar cell will avoid many of the inherent problems normally associated with a GaAlAs window while still proving good passivation of the GaAs surface. An optimized circular grid design for solar cell concentrators has been shown which incorporates a multi-layer metallization scheme. This multi-layer design allows for a greater current carrying capacity for a unit area of shading, which results in a better output efficiency. Author

N86-17845*# Varian Associates, Palo Alto, Calif.
HIGH-EFFICIENCY AlGaAs-GaAs CASSEGRAINIAN CONCENTRATOR CELLS
J. G. Werthen, H. C. Hamaker, G. F. Virshup, C. R. Lewis, and C. W. Ford *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 61-68 refs (For primary document see N86-17839 08-44)
(Contract NAS3-23876)
Avail: NTIS HC A13/MF A01 CSCL 10A

AlGaAs-GaAs heteroface space concentrator solar cells have been fabricated by metalorganic chemical vapor deposition. AMO efficiencies as high as 21.1% have been observed both for p-n and np structures under concentration (90 to 100X) at 25 C. Both cell structures are characterized by high quantum efficiencies and their performances are close to those predicted by a realistic computer model. In agreement with the computer model, the n-p cell exhibits a higher short-circuit current density. Author

N86-17846*# Florida Univ., Gainesville.
EVALUATION OF AlSUBxGaSUB1-xSUBAs SOLAR CELLS
R. Y. Loo, G. S. Kamath, R. C. Knechtli, A. Narayanan, and S. S. Li (Florida Univ., Gainesville) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 69-76 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Single junction GaAs solar cells have already attained an efficiency of 19% AMO which could potentially be increased to approx 20%, with some optimization. To achieve the higher efficiency the concept of multibandgap solar cells which utilizes a wider region of the solar spectrum should be sed. One of the materials for fabricating the top cell in a multibandgap solar cell is AlGaAs because it is compatible with GaAs in bandgap and lattice match. This is a very important consideration from the materials technology point of view, and the viability of this approach is evaluated. Author

N86-17847*# Astrosystems International, Inc., Newark, Del. Astropower Div.
GaAsP ON GaP TOP SOLAR CELLS
James B. McNeely, Gerald H. Negley, and Allen M. Barnett *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 77-85 refs (For primary document see N86-17839 08-44)
(Contract F33615-84-C-2486)
Avail: NTIS HC A13/MF A01 CSCL 10A

GaAsP on GaP top solar cells as an attachment to silicon bottom solar cells are being developed. The GaAsP on GaP system offers several advantages for this top solar cell. The most important is that the gallium phosphide substrate provides a rugged, transparent mechanical substrate which does not have to be removed or thinned during processing. Additional advantages are that: (1) gallium phosphide is more oxidation resistant than the III-V aluminum compounds, (2) a range of energy band gaps higher than 1.75 eV is readily available for system efficiency optimization, (3) reliable ohmic contact technology is available from the light-emitting diode industry, and (4) the system readily lends itself to graded band gap structures for additional increases in efficiency. Author

N86-17848*# Chevron Research Co., Richmond, Calif.
VACUUM MOCVD FABRICATION OF HIGH EFFICIENCE CELLS
L. D. Partain, L. M. Fraas, P. S. McLeod, and J. A. Cape *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 87-95 refs Sponsored in part by Midwest Research Inst. and AFWAL (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Vacuum metal-organic-chemical-vapor-deposition (MOCVD) is a new fabrication process with improved safety and easier scalability due to its metal rather than glass construction and its uniform multiport gas injection system. It uses source materials more efficiently than other methods because the vacuum molecular flow conditions allow the high sticking coefficient reactants to reach the substrates as undeflected molecular beams and the hot chamber walls cause the low sticking coefficient reactants to bounce off the walls and interact with the substrates many times. This high source utilization reduces the materials costs power device and substantially decreases the amounts of toxic materials that must be handled as process effluents. The molecular beams allow precise growth control. With improved source purifications, vacuum MOCVD has provided p GaAs layers with 10-micron minority carrier diffusion lengths and GaAs and GaAsSb solar cells with 20% AMO efficiencies at 59X and 99X sunlight concentration ratios. Mechanical stacking has been identified as the quickest, most direct and logical path to stacked multiple-junction solar cells that perform better than the best single-junction devices. The mechanical stack is configured for immediate use in solar arrays and allows interconnections that improve the system end-of-life performance in space. Author

N86-17849*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
CONTROL OF SUPERLATTICE MORPHOLOGY IN GaAs SUB1-SUBxPSUBx CASCADE CELLS
A. E. Blakeslee and A. Kibbler *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 97-101 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Superlattices of GaAs(1-x)p(x) are being incorporated into cascade solar cell structures in order to reduce the dislocation density in the top cells and thus reduce recombination loss and increase output voltage. For a superlattice to effectively block the propagation of dislocations its average composition must be equal to that of the layer beneath it (from efficiency considerations for a cascade cell, the average composition should be about GaAs(.7)P (.3). When superlattices of this approximate composition were grown on GaAs by MOCVD, severe distortion of the crystal layers was observed. The essential features of this distortion are nonplanar morphology and accelerated etching in regions containing excess phosphorus and clusters of dislocations. Similar observations have been made with superlattices grown with two

other MOCVD systems, indicating that the problem is of fundamental technological significance, not just an artifact of one particular growth system. The nature of the distortion effect is described, and several strategies for preventing its occurrence are presented. Author

N86-17850*# Illinois Univ., Urbana. Dept. of Electrical Engineering.
SUPERLATTICES AND MULTILAYER STRUCTURES FOR HIGH EFFICIENCY SOLAR CELLS
M. Wagner and J. P. Leburton *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 103-109 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Possible applications of superlattices to photovoltaic structures are discussed. A new concept based on doping superstructures (NIPI) can be exploited to significantly reduce recombination losses in III-V compound solar cells. A novel multijunction structure with lateral current transport is proposed. A computer simulation has been performed which shows that by optimizing the multilayer structure, short circuit current is substantially increased with minimum drop in open circuit voltage. An additional advantage of the structure is enhanced radiation tolerance. It is anticipated that this multilayer structure can be incorporated in multibandgap cells to achieve high efficiencies. Author

N86-17851*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A POSSIBLE RADIATION-RESISTANT SOLAR CELL GEOMETRY USING SUPERLATTICES
Chandra Goradia (Cleveland State Univ., Ohio), Ralph Clark, and David Brinker (Cleveland State Univ., Ohio) *In its* Space Photovoltaic Research and Technology 1985 1985 p 111-118 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A solar cell structure is proposed which uses a GaAs nipi doping superlattice. An important feature of this structure is that photogenerated minority carriers are very quickly collected in a time shorter than bulk lifetime in the fairly heavily doped n and p layers and these carriers are then transported parallel to the superlattice layers to selective ohmic contacts. Assuming that these already-separated carriers have very long recombination lifetimes, due to their across an indirect bandgap in real space, it is argued that the proposed structure may exhibit superior radiation tolerance along with reasonably high beginning-of-life efficiency. Author

N86-17852*# Applied Solar Energy Corp., City of Industry, Calif.
EXPERIENCE WITH OMCVD PRODUCTION OF GaAs SOLAR CELLS
Y. C. M. Yeh, P. A. Iles, P. Ho, and K. S. Ling *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 119-125 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The projected promise of the OMCVD approach, i.e., to make high efficiency GaAs space cells, has been demonstrated. The properties and control of the deposited GaAs and AlGaAs layers and the uniformity of the post layer processing have been most satisfactory. In particular the control of the critical thin layers (p-GaAs, p-AlGaAs) has been impressive. Experience has also been gained in routine areas, connected with continuous operation at high capacity. There are still a few areas for improvement, to further increase capacity, and to anticipate and prevent mechanical equipment problems. Author

N86-17853*# Boeing Aerospace Co., Seattle, Wash.
BURST ANNEALING OF ELECTRON DAMAGE IN SILICON SOLAR CELLS
A. C. Day, W. E. Horne, M. A. Thompson, and C. A. Lancaster *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 127-134 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A study has been performed of burst annealing of electron damage in silicon solar cells. Three groups of cells consisting of 3 and 0.3 ohm-cm silicon were exposed to fluences of 2 x 10 to the 14th power, 4 x 10 to the 14th power, and 8 x 10 to the 14th power 1-MeV electrons/sq cm, respectively. They were subsequently subjected to 1-minute bursts of annealing at 500 C. The 3 ohm-cm cells showed complete recovery from each fluence level. The 0.3 ohm-cm cells showed complete recovery from the 2 x 10 to the 14th power e/sq cm fluence; however, some of the 0.3 ohm-cm cells did not recover completely from the higher influences. From an analysis of the results it is concluded that burst annealing of moderate to high resistivity silicon cell arrays in space is feasible and that with more complete understanding, even the potentially higher efficiency low resistivity cells may be usable in annealable arrays in space. Author

N86-17854*# State Univ. of New York, Buffalo.
I-V-T ANALYSIS OF RADIATION DAMAGE IN HIGH EFFICIENCY SI SOLAR CELLS
S. Banerjee, W. A. Anderson, and B. B. Rao *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 135-145 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A detailed analysis of current-voltage characteristics of N(+)-P/P solar cells indicate that there is a combination of different mechanisms which results in an enhancement in the dark current and in turn deteriorates the photovoltaic performance of the solar cells after 1 MeV e(-) irradiation. The increase in the dark current is due to three effects, i.e., bulk recombination, space charge recombination by deep traps and space charge recombination through shallow traps. It is shown that the increase in bulk recombination current is about 2 to 3 orders of magnitude whereas space charge recombination current due to shallow traps increases only by an order or so and no space charge recombination through deep traps was observed after irradiation. Thus, in order to improve the radiation hardness of these devices, bulk properties should be preserved. Author

N86-17855*# State Univ. of New York, Buffalo.
INFLUENCE OF DESIGN VARIABLES ON RADIATION HARDNESS OF SILICON MINP SOLAR CELLS
W. A. Anderson, S. Solaun, B. B. Rao, and S. Banerjee *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 147-158 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Metal-insulator-N/P silicon (MINP) solar cells were fabricated using different substrate resistivity values, different N-layer designs, and different I-layer designs. A shallow junction into an 0.3 ohm-cm substrate gave best efficiency whereas a deeper junction into a 1 to 4 ohm-cm substrate gave improved radiation hardness. I-layer design variation did little to influence radiation hardness. Author

N86-17856*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RADIATION DAMAGE IN HIGH-RESISTIVITY SILICON SOLAR CELLS
I. Weinberg, C. K. Swartz, and C. Goradia (Cleveland State Univ., Ohio) *In its* Space Photovoltaic Research and Technology 1985 1985 p 159-163 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

High-resistivity silicon solar cells exhibit reduced radiation damage when light is incident on the gridded back surface. Under back illumination, radiation damage decreases as cell resistivity increases; under front illumination, radiation damage increases as cell resistivity increases. Thin back-illuminated cells outperform conventional 10 omega cm 50 and 200 micron cells at low 1-MeV electron fluences. However, at higher fluences, the conventional cells exhibit superior radiation resistance. This is attributed to the low BOL diffusion lengths observed in the thin, sack-illuminated

cell. These results are discussed in terms of injected charge distributions, electric fields in the cell base, and the effects of a dominant boron-oxygen defect. E.A.K.

N86-17857*# Boeing Aerospace Co., Seattle, Wash.
PHOTON RADIATION EFFECTS ON CdS/CuInSe2 THIN FILM SOLAR CELLS
H. Dursch, W. Chen, and D. Rusell *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 165-170 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The unknown tolerance of CuInSe2 cells to proton irradiation, was tested. It was shown that CdS/CuInSe2 solar cells have an inherent tolerance to irradiation by 1 MeV electrons up to at least 2 x 10 to the 16th power electrons/sq cm. Eleven, unencapsulated, 1 sq cm cells deposited on alumina substrates were irradiated with 1 MeV protons at normal incidence. The cells were exposed to six fluences ranging from 2.5 x 10 to the 10th power protons/sq cm to 5.0 x 10 to the 13th power protons/sq cm. After each interval of exposure, the cells were removed from the radiation chamber to undergo current/voltage characterization. It is shown that none of the cells electrical characteristics exhibited any degradation up to and including a fluence of 1 x 10 to the 11th power protons/sq cm. At fluences greater than this, the damage to the CuInSe2 cells V sub oc and fill factor (FF) was more severe than that exhibited by the Isc. The CuInSe2 cells proved to be approximately a factor of 50 more resistant to 1 MeV proton irradiation than silicon or gallium arsenide cells. Annealing of a CuInSe2 cell at 225 deg C for 6 minutes restored it to within 95% of its initial efficiency. E.A.K.

N86-17858*# Florida Univ., Gainesville.
DLTS ANALYSIS OF RADIATION-INDUCED DEFECTS IN ONE-MeV ELECTRON IRRADIATED GERMANIUM AND AlSUB0. 17GaSUB0.83As SOLAR CELLS
Sheng B. Li, C. G. Choi, and R. Y. Loo (Hughes Research Labs., Malibu, Calif.) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 171-179 refs (For primary document see N86-17839 08-44)
(Contract F33615-81-C-2058)
Avail: NTIS HC A13/MF A01 CSCL 10A

The radiation-induced deep-level defects in one-MeV electron-irradiated germanium and AlxGal-xAs solar cell materials using the deep-level transient spectroscopy (DLTS) and C-V techniques were investigated. Defect and recombination parameters such as defect density and energy levels, capture cross sections and lifetimes for both electron and hole traps were determined. The germanium and AlGaAs p/n junction cells were irradiated by one-MeV electrons. The DLTS, I-V, and C-V measurements were performed on these cells. The results are summarized as follows: (1) for the irradiated germanium samples, the dominant electron trap was due to the E sub - 0.24 eV level with density around 4x10 to the 14th power 1/cu cm, independent of electron fluence, its origin is attributed to the vacancy-donor complex defect formed during the electron irradiation; (2) in the one-MeV electron irradiated Al0.17Ga0.83 as sample, two dominant electron traps with energies of Ec-0.19 and -0.29 eV were observed, the density for both electron traps remained nearly constant, independent of electron fluence. It is shown that one-MeV electron irradiation creates very few or no new deep-level traps in both the germanium and AlxGa1-xAs cells, and are suitable for fabricating the radiation-hard high efficiency multijunction solar cells for space applications. E.A.K.

N86-17859*# Spectrolab, Inc., Sylmar, Calif.
DEPLETION LAYER RECOMBINATION EFFECTS ON THE RADIATION DAMAGE HARDNESS OF GALLIUM ARSENIDE CELLS
G. F. J. Garlick *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 181-187 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The significant effect of junction depletion layer recombination on the efficiency of windowed GaAs cells was demonstrated. The effect becomes more pronounced as radiation damage occurs. The depletion is considered for 1 MeV electron fluences up to 10 to the 16th power e/sq m. The cell modeling separates damage in emitter and base or buffer layers using different damage coefficients is reported. The lower coefficient for the emitter predicts less loss of performance at fluences greater than 10 to the 15th power e/sq cm. A method for obtaining information on junction recombination effects as damage proceeds is described; this enables a more complete diagnosis of damage to be made. E.A.K.

N86-17860*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF HUGHES GaAs CONCENTRATOR CELLS UNDER 1-MeV ELECTRON IRRADIATION
Henry B. Curtis and Clifford K. Swartz *In its* Space Photovoltaic Research and Technology 1985 1985 p 189-193 ref (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Several Hughes gallium arsenide (GaAs) concentrator cells were exposed to 1-MeV electrons at fluences up to 1x10 to the 15th power electrons/sq cm. Performance data were taken after several fluences, at two temperatures, and at concentration levels from 1 to approx. 150x AMO. Data at 1 sun and 25 deg C were taken with an X-25 xenon-lamp solar simulator. Data at concentration were taken using a pulsed solar simulator with the assumption of a linear relationship between short-circuit current and irradiance. The cells are 5 by 5 mm with a 4-mm diameter illuminated area. E.A.K.

N86-17861*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERPLANETARY EXPLORATION — A CHALLENGE FOR PHOTOVOLTAICS
Paul M. Stella *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 195-202 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Future U.S. interplanetary missions will be less complex and costly than past missions such as Voyager and the soon to be launched, Galileo. This is required to achieve a balanced exploration program that can be sustained within the context of a limited budget. Radioisotope thermoelectric generators (RTGs) have served as the power source for missions beyond the orbit of Mars. It is indicated that the cost to the user of these power sources will significantly increase. Solar arrays can provide a low cost alternative for a number of missions. Potential missions are identified along with concerns for implementation, and some array configurations under present investigation are reviewed. E.A.K.

N86-17862*# Aerospace Corp., Los Angeles, Calif.
TWO YEARS OF ON-ORBIT GALLIUM ARSENIDE PERFORMANCE FROM THE LIPS SOLAR CELL PANEL EXPERIMENT
R. W. Francis and F. E. Betz (Naval Research Lab., Washington, D.C.) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 203-215 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The LIPS on-orbit performance of the gallium arsenide panel experiment was analyzed from flight operation telemetry data. Algorithms were developed to calculate the daily maximum power and associated solar array parameters by two independent methods. The first technique utilizes a least mean square polynomial fit to the power curve obtained with intensity and temperature corrected currents and voltages; whereas, the second incorporates an empirical expression for fill factor based on an open circuit voltage and the calculated series resistance. Maximum power, fill factor, open circuit voltage, short circuit current and series resistance of the solar cell array are examined as a function of flight time. Trends are analyzed with respect to possible mechanisms which may affect successive periods of output power during 2 years of flight operation. Degradation factors responsible for the

on-orbit performance characteristics of gallium arsenide are discussed in relation to the calculated solar cell parameters. Performance trends and the potential degradation mechanisms are correlated with existing laboratory and flight data on both gallium arsenide and silicon solar cells for similar environments. E.A.K.

N86-17863*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PASP: A HIGH VOLTAGE ARRAY EXPERIMENT
John Scott-Monck and Robert Morris (AFWAL, Wright-Patterson AFB, Ohio) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 217-224 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

In the near future, Air Force mission payloads will require significant increases in power. Sophisticated sensing systems such as infrared focal plane detector arrays and radar will be employed by the Air Force to fulfill its strategic objectives. These payloads will demand that the power subsystem provide up to 50 kW at the end of mission life, more than an order of magnitude greater than is currently required. Some of these payloads must be flown in low-Earth polar orbits to satisfy mission objectives, and it is likely that large (500 to 600 sq m) solar photovoltaic arrays will operate in the low-Earth polar environment. The standard 28 volt power subsystem is not weight efficient for the array power levels being considered. The impact of the solar array operating voltage on the total weight of the array and the subsystem power conditioning and distribution components is illustrated. In the interest of reducing power subsystem weight, higher array operating voltages are considered. The problems which the higher array voltage present to the array designer are discussed. In order to provide a maximum return on the tremendous investment of resources required to develop and place these assets in orbit, they must be designed to operate effectively for extended periods of time. To achieve this, the system must be able to function in the threat-induced and natural space environment. E.A.K.

N86-17864*# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero Propulsion Lab.
TESTING OF GALLIUM ARSENIDE SOLAR CELLS ON THE CRRES VEHICLE
Terry M. Trumble *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 225-229 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

A flight experiment was designed to determine the optimum design for gallium arsenide (GaAs) solar cell panels in a radiation environment. Elements of the experiment design include, different coverglass material and thicknesses, welded and soldered interconnects, different solar cell efficiencies, different solar cell types, and measurement of annealing properties. This experiment is scheduled to fly on the Combined Release and Radiation Effects Satellite (CRRES). This satellite will simultaneously measure the radiation environment and provide engineering data on solar cell degradation that can be directly related to radiation damage. E.A.K.

N86-17865*# Aerospace Corp., Los Angeles, Calif.
THERMAL STRESS CYCLING OF GaAs SOLAR CELLS
Bruce K. Janousek, Robert W. Francis, and Jerry P. Wendt *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 231-238 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A thermal cycling experiment was performed on GaAs solar cells to establish the electrical and structural integrity of these cells under the temperature conditions of a simulated low-Earth orbit of 3-year duration. Thirty single junction GaAs cells were obtained and tests were performed to establish the beginning-of-life characteristics of these cells. The tests consisted of cell I-V power output curves, from which were obtained short-circuit current, open circuit voltage, fill factor, and cell efficiency, and optical micrographs, spectral response, and ion microprobe mass analysis (IMMA) depth profiles on both the front surfaces and the front metallic contacts of the cells. Following 5,000 thermal cycles, the performance of the cells was reexamined in addition to any factors which might contribute to performance degradation. It is established that, after 5,000 thermal cycles, the cells retain their power output with no loss of structural integrity or change in physical appearance. E.A.K.

N86-17866*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DEMONSTRATED RESULTS OF WELDED AND SOLDERED INTERCONNECTIONS
Russell E. Hart, Jr. *In its* Space Photovoltaic Research and Technology 1985 1985 p 239-241 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Solar cell modules with welded and soldered interconnections were constructed using a flexible substrate material. These modules were thermally cycled between approx. 80 deg C at rates > 100 cycles/day to demonstrate survivability under simulated low Earth orbit (LEO) temperature conditions. The modules, cycled in an inert atmosphere, show durability for > 36,000 cycles. E.A.K.

N86-17867*# OCLI, Santa Rosa, Calif.
THIN FILM COATINGS FOR IMPROVED ALPHA/EPI
M. Eric Krisl and I. M. Sachs *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 243-255 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

New thin film coatings were developed for fused silica, ceria doped glass, and Corning 0211 microsheet which provide increased emissivity and/or decreased solar absorption. Emissivity is enhanced by suppression of the reststrahlen reflectance and solar absorption is reduced by externally reflecting the ultraviolet portion of the solar spectrum. Optical properties of these coatings make them suitable for both solar cell cover and thermal control mirror applications. Measurements indicate equivalent environmental performance to conventional solar cell cover and thermal control mirror products. E.A.K.

N86-17868*# Communications Satellite Corp., Clarksburg, Md.
POWER REQUIREMENTS FOR COMMERCIAL COMMUNICATIONS SPACECRAFT
W. J. Billerbeck *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 257-278 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Historical data on commercial spacecraft power systems are presented and their power requirements to the growth of satellite communications channel usage are related. Some approaches for estimating future power requirements of this class of spacecraft through the year 2000 are proposed. The key technology drivers in satellite power systems are addressed. Several technological trends in such systems are described, focusing on the most useful areas for research and development of major subsystems, including solar arrays, energy storage, and power electronics equipment. E.A.K.

N86-17869*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE STATION POWER MANAGEMENT AND DISTRIBUTION **c20**
Fred Teren *In its* Space Photovoltaic Research and Technology 1985 1985 p 279-285 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The power system architecture is presented by a series of schematics which illustrate the power management and distribution (PMAD) system at the component level, including converters, controllers, switchgear, rotary power transfer devices, power and data cables, remote power controllers, and load converters. Power distribution options, reference power management, and control

strategy are also outlined. A summary of advanced development status and plans and an overview of system test plans are presented. E.A.K.

N86-17870*# Research Triangle Inst., Research Triangle Park, N.C.
CELL RESEARCH AND TECHNOLOGY WORKSHOP
James Hutchby *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 287-288 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 01A

Four major areas in solar cell research and technology were considered. The areas were: (1) the silicon cell; (2) the GaAs cell; (3) the multibandgap cell; and (4) novel ideas. In each area material research issues, cell research issues, and the cell technology that needs development are considered. E.A.K.

N86-17871*# Boeing Aerospace Co., Seattle, Wash.
SPACE ENVIRONMENT WORKSHOP
W. E. Horne *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 289-292 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Various environmental effects were ranked according to their perceived importance. The relative importance of any particular environment component is viewed within the context of the anticipated mission environment. The chart does serve as, an indication of the historically major environmental concerns for operating space power systems. E.A.K.

N86-17872*# TRW, Inc., Redondo Beach, Calif.
ARRAY TECHNOLOGY AND APPLICATIONS
Paul Goldsmith *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 293-294 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The role of photovoltaics (PV) in advanced missions and its use is discussed. Mission goals were analyzed and advanced concepts were tested. Costs were considered and the viability of the U.S. array industry is examined. E.A.K.

N86-17873# Scientific Consulting Services, Pullman, Wash.
MATHEMATICAL MODEL FOR THE DISTRIBUTION OF THE LONG-TERM EFFICIENCY OF PHASE-CHANGE MATERIALS AND ITS APPLICATION IN HEAT-STORAGE
S. C. Lowell and S. C. Saunders Aug. 1985 40 p
(Contract DE-AI01-76PR-06010)
(DE85-016451; NBS-GCR-85-492) Avail: NTIS HC A03/MF A01

The latent heat of transition of a phase-change material (PCM) like glauber's salt (sodium sulfate decahydrate, NA2 SO4.10 H2O) along with certain additives which are used as nucleating agents, can be utilized for thermal energy storage (TES) if the material is cycled through a temperature range which encompasses its transition temperature. A mathematical model for the degradation in the thermal performance of a salt hydrate phase change storage system is discussed. DOE

N86-17874# Mechanical Technology, Inc., Latham, N. Y.
BREADBOARD DEVELOPMENT OF A HYDRAULICALLY COUPLED FREE PISTON ENGINE HEAT PUMP COMPRESSOR
Thomas J. Marusak 1984 6 p
(DE85-005242; CONF-841231-13) Avail: NTIS HC A02/MF A01

The free piston Stirling engine (FPSE) was considered as a candidate for a thermally activated heat pump because of its potential for high efficiency coupled with long life and high reliability. The distinguishing features of the FPSE, one moving part and hermatic separation of the power cycle and refrigeration cycle working fluids, makes it ideally suited for a heat pump application. However, two major designs challenges have kept the FPSE in the realm of laboratory rather than product development. These challenges involve: effective control of a tuned resonant system over a wide range of loads and hermatic coupling of the driver and driven mechanical members. E.A.K.

N86-17875# Midwest Research Inst., Golden, Colo.
SOLAR THERMAL RESEARCH PROGRAM ANNUAL CONFERENCE
Apr. 1985 221 p Conference held at Denver, Colo., 20 Feb. 1985
(Contract DE-AC02-83CH-10093)
(DE85-002938; SERI/CP-251-2680; CONF-850252) Avail: NTIS HC A10/MF A01

Technical reports presented at the conference on research conducted in support of the Solar Thermal Research program are documented. Individual reports are abstracted and separately indexed for inclusion in the Energy Data Base. DOE

N86-17876# Sandia National Labs., Albuquerque, N. Mex.
SOLAR THERMAL TECHNOLOGY ANNUAL EVALUATION REPORT, FISCAL YEAR 1984
Jul. 1985 90 p Prepared in cooperation with Sandia National Labs., Livermore, Calif. and Midwest Research Inst., Golden, Colo.
(Contract DE-AC02-83CH-10093)
(DE85-002950; DOE/CE-T13) Avail: NTIS HC A05/MF A01

This annual evaluation report provides the accomplishments and progress of government-funded activities initiated, renewed, or completed during Fiscal Year 1984 (FY 1984: October 1, 1983 through September 30, 1984). It highlights the program tasks conducted in-house by the participating national laboratories or under contract by industrial, academic, or other research institutions. The focus of the STT program tasks is research and development leading to the commercial readiness of four primary solar thermal concepts: (1) central receiver, (2) parabolic dish, (3) parabolic trough, and (4) hemispherical bowl. DOE

N86-17877# Midwest Research Inst., Golden, Colo.
ANALYSIS OF SIMULTANEOUS HEAT AND MASS TRANSFER IN SOILS BELOW SOLAR PONDS
C. M. Leboeuf Jun. 1985 7 p Presented at the INTERSOL 1985 Solar Energy--the Diverse Solution, Montreal, Quebec, 23 Jun. 1985
(Contract DE-AC02-83CH-10093)
(DE85-012163; SERI/TP-253-2744; CONF-850604-17) Avail: NTIS HC A02/MF A01

This paper examines thermal losses from a solar pond to the underlying soil. A model that includes coupled heat and moisture transport in soils and was originally developed for agricultural analysis is extended to solar pond performance analysis. The model describes a physical system in which soil particles and void spaces are assumed to be randomly arranged ellipsoids in a continuous medium of water or air. The general problem reduces to two coupled partial differential equations, one for heat transfer, the other for moisture transport. Using property data for a specific soil, we use the model to determine under what conditions the soil will dry in response to the imposed thermal source of the solar pond and to predict the effect the steady-state soil conditions will have on pond performance. Results of this study also apply to other fields in which a heat source is directly coupled to the ground. DOE

N86-17878# Sandia National Labs., Albuquerque, N. Mex.
PHOTOVOLTAIC ARRAY PERFORMANCE SIMULATION MODELS
D. F. Menicucci 1985 11 p Presented at the PV and Isolation Measurements Workshop, Vail, Colo., 1 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016542; SAND-85-1764C; CONF-850783-2) Avail: NTIS HC A02/MF A01

The experience of the solar industry confirms that despite recent cost reductions the profitability of photovoltaic (PV) systems is often marginal and the configuration and sizing of a system is a critical problem for the design engineer. Construction and evaluation of experimental systems are expensive and seldom justifiable. A mathematical model or computer simulation program is a desirable alternative, provided reliable results can be obtained. Sandia National Laboratories, Albuquerque (SNLA), has been

studying PV system modeling techniques in an effort to develop an effective tool to be used by engineers and architects in the design of cost-effective PV systems. This paper reviews two of the sources of error found in previous PV modeling programs, presents the remedies developed to correct these errors, and describes a new program that incorporates these improvements. DOE

N86-17879# Radiation Monitoring Devices, Inc., Watertown, Mass.
LOW COST, SPRAYED CuInSe2 SOLAR CELL RESEARCH Final Report, 15 Sep. 1982 - 30 Jun. 1985
M. R. Squillante, L. Moy, and G. Entine 1985 44 p
(Contract DE-AC02-82ER-13026)
(DE85-016953; DOE/ER-13026/T2) Avail: NTIS HC A03/MF A01

This research investigated a new spray pyrolysis technique for depositing cost effective, thin films of CuInSe2 for terrestrial solar cell applications. This process is attractive because of its inherent simplicity which has permitted large scale production of high quality, thin films at low cost of a variety of materials. This program was directed at determining the chemical and physical conditions required to produce high quality films and at characterizing and understanding the properties of the films produced. During this research effort, we investigated the spray solution chemistry, the deposition parameters, the film properties, and the characteristics of solar cell devices fabricated using the sprayed films. The results are very encouraging but further work is needed to fully examine the use of this unique deposition process in the manufacturing of CuInSe2 solar cells. DOE

N86-17880# Department of Energy, Washington, D. C.
TRANSMISSIVE METALLIC CONTACT FOR AMORPHOUS SILICON SOLAR CELLS Patent Application
A. Madan, inventor (to DOE) (Midwest Research Inst., Golden, Colo.) Filed 29 Nov. 1984 21 p
(Contract DE-AC02-83CH-10093)
(DE85-017724; US-Patent-Appl-SN-676047) Avail: NTIS HC A02/MF A01

A transmissive metallic contact for amorphous silicon semiconductors includes a thin layer of metal, such as aluminum or other low work function metal, coated on the amorphous silicon with an antireflective layer coated on the metal. A transparent substrate, such as glass, is positioned on the light reflective layer. The metallic layer is preferably thin enough to transmit at least 50% of light incident thereon, yet thick enough to conduct electricity. The antireflection layer is preferably a transparent material that has a refractive index in the range of 1.8 to 2.2 and is approximately 550A to 600A thick. DOE

N86-17881# Department of Energy, Washington, D. C.
COMPOSITE MATERIALS FOR THERMAL ENERGY STORAGE Patent Application
D. K. Benson (Midwest Research Inst., Golden, Colo.), R. W. Burrows (Midwest Research Inst., Golden, Colo.), and Y. D. Shinton, inventors (to DOE) (Midwest Research Inst., Golden, Colo.) Filed Jan. 1985 40 p
(Contract DE-AC02-83CH-10093)
(DE85-017743; US-Patent-Appl-SN-688668) Avail: NTIS HC A03/MF A01

A composite material for thermal energy storage based upon polyhydric alcohols, such as pentaerythritol, trimethylol ethane (also known as pentaglycerine), neopentyl glycol and related compounds including trimethylol propane, monoaminopentaerythritol, diaminopentaerythritol and tris(hydroxymethyl)acetic acid, separately or in combinations, which provide reversible heat storage through crystalline phase transformations are discussed. These PCM's do not become liquid during use and are in contact with at least one material selected from the group consisting of metals, carbon, siliceous, plastic, cellulosic, natural fiber, artificial fiber, concrete, gypsum, porous rock, and mixtures thereof. Particulate additions such as aluminum or graphite powders, as well as metal and carbon fibers can also be incorporated therein. Particulate and/or fibrous additions can be introduced into molten phase change materials which can then be cast into various shapes. After the phase change materials have solidified, the additions will remain dispersed throughout the matrix of the cast solid. The polyol is in contact with at least one material selected from the group consisting of metals, carbon, siliceous, plastic, cellulosic, natural fiber, artificial fiber, concrete, gypsum, and mixtures thereof. DOE

N86-17882# Sandia National Labs., Albuquerque, N. Mex.
SANDIA GEOTHERMAL TECHNOLOGY PROGRAM: INTERACTIONS WITH OTHER DOE RESEARCH AND CSDP
R. K. Traeger 1985 11 p Presented at the Geothermal Program Review, Washington, D.C., 11 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017814; SAND-85-1871C; CONF-8509142-2) Avail: NTIS HC A02/MF A01

When the energy programs were initiated in the mid 1970's, Sandia management made a conscious decision to apply existing engineering expertise and capabilities in support of industry, government and university needs. A decision was made not to expend resources independently developing a panacea for the US energy ills. Consequently, exchange of information and technology with others occurred from the start prior to the Tech Transfer buzz words of the 1980's. The purpose of this paper is to briefly outline the Geothermal Technology Development (GTD)-supported Sandia programs. Then, the author will show how these programs interact with other energy programs at Sandia. Finally, the author will discuss the overall Continental Scientific Drilling Program, its status, and Sandia GTD interactions with CSDP. DOE

N86-17883*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LASER-ASSISTED SOLAR CELL METALLIZATION PROCESSING Quarterly Report, 1 Mar. - 30 Jun. 1985
A. Rohatgi, P. G. McMullin, and P. A. Palaschak 25 Jul. 1985 22 p
(Contracts NAS7-100; JPL-956615)
(NASA-CR-176457; NAS 1.26:176457; DE85-018032; DOE/NBM-5018032; QR-6) Avail: NTIS HC A02/MF A01 CSCL 10A

A new lens was installed in the laser; the laser power was lowered and solar cells were made at different power levels. The concentration of the silver neodecanoate solution was changed to reduce linewidth. A cell fabrication run was completed using low-resistivity float-zone silicon. Experiments were initiated to investigate the use of titanium organometallic film, which not only forms an AR coating with a 400(0)C hard bake, but may also help in bypassing front-metal evaporation because of high-reactivity of Ti with silicon. Progress in these areas is discussed. DOE

N86-17884# Oak Ridge National Lab., Tenn.
NUMERICAL STUDY OF THE PERFORMANCE OF LATENT HEAT STORAGE FOR SOLAR DYNAMIC POWER SYSTEMS
A. D. Solomon 1985 13 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018101; CONF-850808-24) Avail: NTIS HC A02/MF A01

A conceptual design of a space station power system based on a Brayton cycle and solar power has been developed. A key component of such a system is the thermal energy storage module, which is of crucial importance during periods of darkness. We have developed a computer program - FPAK1.F, simulating one possible storage design. We describe the code and using it, raise some questions about the system under study. DOE

N86-17885# Oak Ridge National Lab., Tenn.
RESULTS ON THE CHARACTERIZATION OF GAS HYDRATE FORMATION IN A DIRECT CONTACT HEAT PUMP COOL STORAGE SYSTEM
M. P. Ternes Jul. 1985 167 p
(Contract DE-AC05-84OR-21400)
(DE85-018126; ORNL/TM-9212) Avail: NTIS HC A08/MF A01

This report describes an investigation of a latent cool storage system which employs a refrigerant gas hydrate as the storage medium. A refrigerant gas hydrate is a compound consisting of a refrigerant gas molecule contained within a crystalline water molecule cage. In this system, the storage component is incorporated directly into the refrigeration cycle, replacing the conventional evaporator. The refrigerant is used not only to form the gas hydrate, but also as a direct contact heat exchange fluid to remove heat from the storage tank. In this investigation, only the charging phase of the process was examined; that is, only the characteristics of the formation of gas hydrate were studied. The results of the tests showed that liquid refrigerant must be dispersed throughout the water in the storage tank during charging to obtain acceptance. DOE

N86-17886# Department of Energy, Washington, D. C.
ELECTROCHEMICAL STORAGE AND CONVERSION: BATTERIES AND FUEL CELLS
1985 14 p
(DE85-018177; DOE/CE-0152) Avail: NTIS HC A02/MF A01

A brief look at both recent and historical research and development efforts on electric batteries is presented. Both the primary (throw away) and secondary (rechargeable) batteries are investigated. Advanced batteries that will become available in the future are briefly discussed. DOE

N86-17887# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Neue Technologie.
TEST AND OPERATION PROGRAM STEP 100 (GERMAN-AUSTRALIAN SOLAR POWER PLANT IN MEEKATHARRA, WESTERN AUSTRALIA) Final Report, Jun. 1984
Eckart Hellweg and Gerd Hanselmann Bonn Bundesministerium fuer Forschung und Technologie Aug. 1985 48 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-077; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10

Operating experience with the combined solar-waste-heat plant STEP 100 is described. The test program, the boundary conditions, and the global behavior of the plant are reviewed. Collector field, waste heat system, storage system, and energy conversion system are described. The solar part yields satisfactory results. The waste heat recovery encountered problems caused by insufficient provision for interaction effects between the diesel and solar plants. Author (ESA)

N86-17888# Technische Hogeschool, Twente (Netherlands). Windmill Group.
THE CWD 4000 PROJECT (FORMERLY THT-1) Final Report
K. Kleft Feb. 1984 58 p refs
(WM-075) Avail: NTIS HC A04/MF A01

A wooden frame windmill development program is described. A technically feasible machine was produced, but it does not meet standardization specifications, so the project was abandoned. Author (ESA)

N86-17889# Technische Hogeschool, Twente (Netherlands). Windmill Group.
[ACTIVITIES REPORT ON THE TECHNICAL HIGHSCHOOL TWENTE (THT) CWD WINDMILL PROJECT] Annual Report, 1984
Sirp J. deBoer Feb. 1985 29 p refs
(WM-090) Avail: NTIS HC A03/MF A01

Consultancy services in wind energy in developing nations are summarized. Knowledge transfer, and research and development on windpowered pumps and generators are described. Author (ESA)

N86-17890# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
RESONANCE PRODUCTION IN GAMMA GAMMA COLLISIONS 2
F. C. Erne Feb. 1985 12 p refs Presented at 6th International Workshop on Photon-Photon Collisions, Tahoe, Calif., 10-13 Sep. 1984
(NIKHEF-H/85-2; B8563366) Avail: NTIS HC A02/MF A01

The assumption of vector dominance for both photons in gamma gamma-collisions is examined. The expectation that elastic scattering and charge-exchange reactions will occur from a variety of incoming vector mesons, with the attendant resonance formation and t-channel exchanges is considered. Data on vector-meson production and its Q sq dependence are analyzed to test this picture. Results suggest a variety of objects permitted by QCD, such as four-quark states and glueballs. Research on gamma gamma excitation of Charmonium states is reviewed. Author (ESA)

N86-17891# Siemens A.G., Munich (West Germany). Forschungslab.
AMORPHOUS SILICON SOLAR CELLS, PHASE 2 Final Report, Sep. 1983
Eberhard Guenzel, Wilfried Juergens, Helmold Kausche, Wolfgang Kruehler, Wilhelm Kusian, Matthias Moeller, Winfried Peters, Hans Pfleiderer, Rolf Plaettner, Bernhard Rauscher et al Bonn, West Germany Bundesministerium fuer Forschung und Technologie Sep. 1985 179 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-084; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34.50

Problems in the development of small and large amorphous silicon solar cells with 10% conversion efficiency as well as the electrical and optical measurement results are presented. The production and characterization of front layers with enlarged band distance for a-Si:H solar cells are reported. Cells with boron-doped aSiC:H window layers were produced with a glass SnO2 pin metal structure, with 9.8% efficiency. The effects of the substrate on the electrical cell properties, as well as the doping material concentrations and the residual gas effects in the glow discharge reactor were studied. Solutions to pinholes and structuration of large cells with selective laser etching were found. Cell aging behavior and degradation was studied by measuring the space charge limited current, spectral sensitivity, and diffusion lengths for investigation of the Staebler-Wronski effect on a-Si:H diodes. Author (ESA)

N86-17892# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Fachbereich Neue Technologie.
FIELD TEST OF AN AUTONOMOUS WIND-DIESEL POWER PLANT Final Report, Aug. 1983
Albert Fritzsche, Uwe Knoebel, and Wolfgang Ruckert Bonn, West Germany Bundesministerium fuer Forschung und Technologie Sep. 1985 138 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-092; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 29

An autonomous power plant composed of a wind energy converter and a diesel generator was tested in laboratory and in the field to assess the wind energy supply as a noninfluenceable parameter in the regulation of the mono and bivalent operation of the power plant, for control of the dynamic behavior of the electrical components, for tuning of the regulation expenditure with comfort requirements, and for model evaluation of energy cost analysis. The interaction between meteorological, technical, economic and energy policy aspects was assessed. The relationship between economical use and comfort limits technical improvement. Development of the concept of a bivalent power supply with wind and diesel is recommended. Author (ESA)

N86-17893# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Apparate.
DEVELOPMENT OF THIN-FILM SOLAR CELLS BASED ON AMORPHOUS SILICON Final Report, Dec. 1983

Gerhard Mueller and Gerhard Winterling Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-096; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

The characteristics of a-Si:H layers and doped window layers under plasma decomposition conditions were studied and optimized by reducing optical absorption for development of cells with improved efficiency (up to 8%) and for mass production. The production of doped polycrystalline Si layers and SiC layers and their integration in the a-Si cell for heterocell formation were studied. The a-Si laboratory cell stability under prolonged illumination was analyzed. A 9% to 10% efficiency can be attained with further development of the heterocell structure and with improvement of red exploitation. Long term stability depends on the preparation conditions of a-Si and on the cell structure (light entry through the p+ or n+ layer). Amorphous Si cells with medium efficiency could be produced with acceptable long term stability by adequate selection of the cell structure (pin) and the fine doping of the i-layer. Recommendations for improvement of efficiency and long time stability and for time savings in the cell production and in the a-Si preparation are made. Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-17894 British Library Lending Div., Boston Spa (England).
CONTINUOUS MEASUREMENT OF SODIUM AEROSOLS IN THE AIR
J. Unk, K. H. Kleiber, and E. Wollensack Jul. 1985 5 p Transl. into ENGLISH from Chemie-Ingenieur-Technik (West Germany), v. 57, no. 2, 1985 p 147-148
Avail: British Library Lending Div., Boston Spa, Engl.

For investigation of the properties of materials for reactor components under the influence of flowing sodium at high temperatures two test loops were set up. To achieve the best possible agreement of the experimental conditions with the actual operational conditions in the reactor the sodium in the test loops is heated and cooled to the appropriate temperatures. Cooling of the sodium takes place in the last stage through an air cooler of closed design. Analysis of possible accident conditions showed that a leak in the tubes of the sodium air cooler, through which sodium is flowing, cannot be detected by the operating personnel in the interior of the test building since the air used for cooling is sucked by a blower inside the building, conducted through the cladding of the air cooler and removed through a pipe over the roof. For the early and certain detection of a leak inside the sodium air cooler, the cooling air conducted above the roof must be monitored. Work was started to develop an exhaust air monitoring instrument of this nature. B.W.

N86-17895# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
POLLUTANT DISPERSAL
1985 420 p refs Presented at Lecture Series held in Rhode Saint Genese, Belgium, 11-15 Feb. 1985
(VKI-LS-1985-02) Avail: NTIS HC A18/MF A01

Pollutant dispersal in the atmosphere is discussed, including atmospheric boundary layer modeling; field trials, dispersion modeling; numerical techniques; dispersion of heavy gases; fluctuating wind effects; experimental facilities and techniques; historical notes; and application of three dimensional models to New York city. For individual titles, see N86-17896 through N86-17904.

N86-17896# Riso National Lab., Roskilde (Denmark).
ATMOSPHERIC BOUNDARY LAYER MODELING **c47**
N. O. Jensen *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 77 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

Models of the atmospheric boundary layer are described. Stationary and horizontally homogeneous conditions are examined, describing the surface layer and then moving into the Ekman Layer. Models of simple cases of instationarity and inhomogeneity are described. Monin-Obukhof similarity, turbulence analyses, and mixed layer scaling are discussed. Author (ESA)

N86-17897# Nuclear Energy Centre, Mol (Belgium).
SENSITIVITY, APPLICABILITY AND VALIDATION OF BI-GAUSSIAN OFF- AND ON-LINE MODELS FOR THE EVALUATION OF THE CONSEQUENCES OF ACCIDENTAL RELEASES IN NUCLEAR FACILITIES Final Report **c47**
J. G. Kretzschmar, I. Mertens, and B. Vanderborght *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 79 p refs (For primary document see N86-17895 08-45)
(Contract SR-028-B)
(EUR-9385-EN) Avail: NTIS HC A18/MF A01

Tracer dispersion experiments using SF6 gas were performed and evaluated in order to verify atmospheric dispersion models. The tracer emission and sampling procedures are described. A gas cromatograph was used. Some of the experiments are well simulated by a Gaussian distribution, but others are not. A subjective optimization of the parameters of the fit was adopted. The uncertainty in the measurements of the wind speed as a function of height is discussed. The area covered by a plume as detected by the experiment is shown and compared to data from a simulation model. The deviations are discussed. Author (ESA)

N86-17898# Electricite de France, Chatou.
NUMERICAL TECHNIQUES AND DISPERSION MODELING **c47**
J. Y. Caneill and A. E. Saab *In* Von Karman Inst. for Fluid Dynamics. Pollutant Dispersal 1985 21 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

Numerical solutions of the atmospheric transport-diffusion equation are discussed, and first and second order dispersion models are analyzed to describe the state of the art in Eulerian and quasi Lagrangian modeling of transport-diffusion of pollutants. An assessment of model performance demonstrates poor agreement between calculations and field observations for a variety of objective validation criteria. Author (ESA)

N86-17899# United Kingdom Atomic Energy Authority, Culcheth (England). Safety and Reliability Directorate.
DISPERSION OF HEAVY GASES
C. J. Wheatley *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 57 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

It is shown that chemical reactions, possibly involving atmospheric moisture can have a very strong influence on the density of heavy gas clouds. Consequences of heavy gas dispersion for safety are discussed. It is shown that field trials enable testing of the physical content of the model. Author (ESA)

N86-17900# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
FLUCTUATING WIND EFFECTS **c47**
S. Brown *In its* Pollutant Dispersal 1985 47 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The dispersion of a pollutant in a flow field that has large scale fluctuations was studied. The turbulent variables, velocity and concentration, are separated into three components and introduced in that form into the partial differential equation describing the pollutant dispersal. Correlations between the averages and between turbulent fluctuations are obtained. Wind

tunnel experiments measured the correlations in a controlled large scale fluctuation flow field. The measurement of the cross-correlation terms illustrates the convective nature of the transport when short time scales are considered. It is shown that the presence of large fluctuations does not greatly affect turbulent diffusion. Author (ESA)

N86-17901# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
LAGRANGIAN MODELING OF TURBULENT DISPERSION c47
C. Benocci and D. Olivari *In its* Pollutant Dispersal 1985 41 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The dispersion of neutral or buoyant contaminants in turbulent flow is simulated by the release of marked particles whose trajectories can be determined following the theory of continuous stochastic processes. Guidelines for the implementation of stochastic theory in a practical computer program are given, with particular reference to the prediction of heavy gas dispersal in the atmospheric boundary layer. Comparison with experimental data demonstrates the feasibility of prediction of heavy gas dispersal from line sources using the model. Author (ESA)

N86-17902# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: FACILITIES AND TECHNIQUES c34
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 49 p (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

Modeling techniques for gas dispersion, free convection, drainage flows, boundary layer simulations under neutral, stable and unstable conditions, and regional simulation are discussed. The facilities at 13 research centers are summarized, detailing wind tunnel, tow tank, and wind over water or water channel equipment characteristics. The desired characteristics of modeling facilities are discussed through the analysis of problem areas.
Author (ESA)

N86-17903# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: HISTORICAL NOTES c34
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 13 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The history of experimental fluid dynamics to the first half of the 20th century is summarized. The development of the meteorological sciences in the 20th century is commented on.
Author (ESA)

N86-17904# San Jose State Univ., Calif. Dept. of Meteorology.
APPLICATION OF LINKED THREE-DIMENSIONAL PLANETARY BOUNDARY LAYER (PBL) AND DISPERSION MODELS TO NEW YORK CITY c47
R. Bornstein, U. Pechinger (Zentralanstalt fuer Meteorologie und Geodynamik, Vienna, Austria), R. Street (Stanford Univ., Calif.), F. Ludwig (SRI International, Menlo Park, Calif.), S. Klotz (Stanford Univ., Calif), R. Salvador, L. J. Shien (IBM, Palo Alto, Calif.), and R. Miller *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 22 p refs Presented at 15th NATO/CCMS Conference, St. Louis, Mo., 16-20 Apr. 1985 (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The two dimensional vorticity mode urban planetary boundary layer (PBL) model of Bornstein is extended to three dimensions and used to simulate sea breeze circulations in the coastal urban envelopment of New York city. The output from the PBL model is used as input to a modified form of the three dimensional Eulerian urban air pollution model developed by Shir and Shieh. The dispersion model is used to simulate the distribution of sulfur dioxide concentrations resulting from point and area source emissions into the sea breeze circulation. The models correctly simulate most of the qualitative features of the time varying polluted coastal urban boundary layer. Author (ESA)

N86-17905# Pacific Northwest Lab., Richland, Wash. Earth Sciences Dept.
ATMOSPHERIC DISPERSION MODELS AND THEIR LIMITATIONS
J. V. Ramsdell Jun. 1985 17 p Presented at the Health Physics Summer School, Evanston, Ill., 6 Jun. 1985
(Contract DE-AC06-76RL-01830)
(TI85-018522; PNL-SA-13230; CONF-8506136-2; NRC-FIN-B2001)
Avail: NTIS HC A02/MF A01

Atmospheric dispersion models generally have three uses when emergency response is considered: preincident planning, dispersion estimates during the incident, and postincident assessment. Atmospheric dispersion models for use during incidents, and their general concepts are discussed. The following areas are examined: (1) description of basic models and their underlying assumptions; (2) modeling limitations and constraints; and (3) model evaluation.
E.A.K.

N86-17906# Oak Ridge National Lab., Tenn.
CHARACTERIZATION AND MITIGATION OF ORGANIC VAPORS
A. R. Hawthorne, T. G. Matthews, and R. B. Gammage 1985 11 p Presented at the Air Pollution Control Association Annual Meeting and Exhibition, Detroit, Mich., 16 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016410; CONF-850612-9) Avail: NTIS HC A02/MF A01

The more established methodology of pumped vapor collection on solid sorbents followed by gas chromatography or gas chromatography/mass spectrometry for characterizing emissions and resulting indoor concentrations of organic pollutants is reviewed. In addition, less frequently used alternative approaches that emphasize low-cost, rapid response methods of characterizing indoor organic pollutants are presented. Examples include a portable photoionization gas chromatograph and a nondestructive formaldehyde surface emission monitor. Highlights of an experiment in an unoccupied research house to evaluate the effectiveness of permeation barriers in reducing the formaldehyde emission rate from particleboard underlayment and the corresponding room concentrations are discussed. DOE

N86-17907# Pacific Northwest Lab., Richland, Wash.
ACID DEPOSITION SYSTEM (ADS) DATA BASE, DATA SUMMARY PROCEDURES AND STATISTICAL REPORTING OF SPATIAL PATTERNS AND TRENDS
A. R. Olsen and A. L. Slavich Sep. 1985 10 p Presented at the National Acid Precipitation Assessment Program Task Groups A Through D Peer Review, Boulder, Colo., 9 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017910; PNL-SA-13358; CONF-8509108-1) Avail: NTIS HC A02/MF A01

Wet deposition data are being collected by many organizations in the United States and Canada. Each organization has selected field sampling and laboratory analysis protocols based on their objectives and has organized the resulting wet deposition data accordingly. The Acid Deposition System (ADS) for data storage and statistical reporting of wet deposition data has been designed and implemented to provide an integrated, centralized data repository for data collected by wet deposition monitoring networks in the United States and Canada. The purposes of ADS are (1) to facilitate access to deposition data collected by different networks, (2) to provide annual statistical summaries of available data, and (3) to perform analyses of spatial and temporal trends. The ADS data base has been designed and implemented to include the wet deposition data from the NTN, NADP, CANSAP, APN, APIOS, UAPSP, WISCONSIN and MAP3S networks. Other networks, with quality assured and documented data, are being added as they meet ADS data transfer requirements. The integration of networks requires careful definition of network data screening and

coding procedures to ensure the compatibility of data for the preparation of common statistical summaries. DOE

N86-17908# Pacific Northwest Lab., Richland, Wash.
INFLUENCE OF A LARGE SULFUR DIOXIDE POINT SOURCE ON MESOSCALE RAINWATER CHEMISTRY
A. J. Alkezweeny and N. S. Laulainen Aug. 1985 10 p Presented at the National Acid Precipitation Assessment Program Task Groups A Through D Peer Review, Boulder, Colo., 9 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE85-018215; PNL-SA-13406; CONF-8509108-2) Avail: NTIS HC A02/MF A01

We are measuring the spatial and temporal variations in rainwater chemical composition at forty ground-level sites near (within 100 km) a large sulfur dioxide point source (a copper smelter). Simultaneous measurement of particulate chemical composition in the surrounding air both at ground level and in the plume as well as knowledge of sulfur dioxide emissions as a function of time allow us to estimate the contribution of this source to the total wet deposition downwind. Similar measurements of the chemical composition of rain and air after closure of this source will allow us to verify our estimates of the source's contribution to downwind rainwater chemistry. The closure of this relatively isolated source in an area with a clean background provides a unique opportunity to examine these source-receptor relationships and the models used to predict them. A key assumption in this work is that the variability in rainwater chemical composition due to both sampling and analysis procedures as well as meteorology of selected storms is small when compared with the spatial variability due to the smelter influence. Results to date indicate that is the case. To the extent that this source imposed variability is important for a number of chemical species, it should be possible to test a variety of deterministic and multivariate statistical models of precipitation scavenging and wet deposition. DOE

N86-17909# Argonne National Lab., Ill.
CLIMATOLOGICAL VARIABILITY IN THE EVALUATION OF COST EFFECTIVENESS OF EMISSION CONTROL STRATEGIES TO REDUCE ACID DEPOSITION
J. D. Shannon and D. G. Streets 1985 12 p refs Presented at the 15th International Technical Meeting on Air Pollution Modeling and Its Application, St. Louis, Mo., 15 Apr. 1985
(Contract W-31-109-eng-38)
(DE85-018375; CONF-8504135-3) Avail: NTIS HC A02/MF A01

Variations in emission reductions and control costs that derive from the sensitivity of cost-effective control strategies to climatological variability are evaluated. Sensitivity to meteorological conditions was conducted using six individual years of data, 1976 to 1981, together with a six-year averaged data set. Only single-target strategies were examined. That is, control of sulfur dioxide emissions is the mechanism for reduction of acidic deposition, and deposition of total sulfur as sulfate equivalent is the measure of effectiveness. DOE

N86-17910# Pacific Northwest Lab., Richland, Wash.
ACID RAIN: A PRIMER ON WHAT, WHERE, AND HOW MUCH
W. R. Barchet Apr. 1985 26 p Presented at the National Conference on Hazardous Wastes and Environmental Emergencies, Cincinnati, Ohio, 14 May 1985
(Contract DE-AC06-76RL-01830)
(DE85-017864; PNL-SA-13199; CONF-8505149-2) Avail: NTIS HC A03/MF A01

Acid rain is introduced by defining its components: wet and dry deposition. Data bases on precipitation chemistry from several monitoring networks are used to show where acid rain occurs. Precipitation chemistry and air quality data are used to discuss what is in acid rain. Maps of the deposition of the major constituents of wet deposition are presented to contrast the amount of material deposited (deposition) in acid rain with its composition (concentration). The interactions of acid rain with the surfaces on which it falls are used to trace the paths by which acid rain reaches surface and soil waters. Implications of acid rain effects are introduced but not discussed in detail. DOE

N86-17911# Oak Ridge National Lab., Tenn.
EFFECTS OF ACID RAIN ON FOREST NUTRIENT STATUS
D. W. Johnson, D. W. Cole, J. M. Kelly, J. W. Webb, D. D. Richter, and H. VanMiegroet Aug. 1985 48 p refs
(Contract DE-AC05-84OR-21400)
(DE85-018120; ORNL/TM-9729; Publ-2498) Avail: NTIS HC A03/MF A01

In five forest sites (three in eastern Tennessee and two in western Washington) the effect of natural carbonic acid production on soil leaching was equaled or exceeded by that of atmospheric acid inputs. In a nitrogen-fixing red alder site in Washington, however, internal leaching by nitrification and nitric acid formation far exceeded atmospheric H(+) inputs at any site. All other sites retained NO3(-), and soil SO4(2-) adsorption reduced the effectiveness of atmospheric H2SO4 inputs on soil leaching in two of the Tennessee sites and in the Washington red alder site. The very high natural leaching rates in the red alder stand have significantly acidified, and continue to acidify, that soil. At all other sites, base cation loss rates were not large enough to rapidly deplete soil exchangeable cation reserves, and no long-term significant soil acidification by acid deposition is foreseen. Furthermore, scarce or potentially limiting cations (such as Ca(2+) in one of the Tennessee sites) are being conserved despite accelerated leaching rates. Atmospheric sulfur inputs exceeded forest sulfur requirement in all five sites. Excess sulfur accumulated to a minor extent as SO4(2-) in vegetation, but soils were the major repository for excess SO4(2-). The greatly enhanced nitrogen status of the red alder stand appeared to have lowered SO4(2-) in both vegetation and soils at that site as compared to the adjacent nitrogen-poor Douglas-fir site. Decomposer invertebrates appeared to be affected negatively by unrealistically large applications of SO4(2-), either as KHSO4 or K2SO4. Forest floor buffering prevented large changes in pH with acid SO4(2-) treatments. Results indicate that effects of acid deposition on decomposer invertebrates are unlikely except at input levels much higher than ambient. DOE

N86-17912# Argonne National Lab., Ill.
OXYGEN-18 STUDY OF THE ATMOSPHERIC-AQUATIC LINKAGE IN THREE ADIRONDACK LAKE WATERSHEDS
B. D. Holt and R. Kumar 1985 14 p Presented at the Muskoka Conference: International Symposium on Acidic Precipitation, Toronto, Ontario, 15 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018355; CONF-850944-1) Avail: NTIS HC A02/MF A01

Twelve monthly measurements were made of the delta(18)O of the water and of the dissolved sulfates in inlet streams and in outlet streams of lakes in three watersheds in the Adirondack Park region of New York. The average delta(18)O/sub H2O/ of the surface waters (streams and lakes) of the three watersheds was well within the typical range of seasonally varying delta(18)O/sub H2O/ of precipitation water; however, the delta(18)O/sub SO4(2-)/ of the surface waters was significantly lower than the typical range of seasonally varying delta(18)O/sub SO4(2-)/ in precipitation water. Two possible causes for the apparent alteration of delta(18)O of the sulfates, during the water percolation of various ground strata in the ground link between the atmosphere and watershed lakes are: (1) bacteriological redox cycling, in which the sulfate is bacterially reduced, allowing isotopic equilibration between the HSO3(-) ion and associated water, before catalytic reoxidation by air back to sulfate; and/or (2) ion exchange, in which the soil strata, containing chemically fixed sulfate, behave as a column which is not yet in sulfate-ion equilibrium with the sulfate in atmospheric recharge water. DOE

N86-17913# Argonne National Lab., Ill.
VARIABILITY IN PATTERNS OF ACID DEPOSITION RESULTING FROM CLIMATOLOGICAL VARIABILITY
J. D. Shannon, B. M. Lesht, and P. J. Samson 1985 4 p Presented at the 9th Conference on Probability and Statistics in Atmospheric Sciences, Virginia Beach, Va., 9 Oct. 1985 Prepared in cooperation with Michigan Univ., Ann Arbor
(Contract W-31-109-eng-38)
(DE85-018392; CONF-851028-2) Avail: NTIS HC A02/MF A01

The Trajectory Regional Air Pollution (ASTRAP) model produces long-term, typically seasonally averaged atmospheric concentration fields and cumulative wet or dry deposition fields over scales of 100 km to continental distances for oxides of sulfur and nitrogen. Here we examine only oxides of sulfur. Twenty-four seasonal patterns over the United States and Canada of both wet and dry deposition of total sulfur have been simulated. In addition, six annual deposition fields have been produced from addition of the appropriate seasonal fields. Isopleths of six-year average seasonal and annual deposition have also been generated. DOE

N86-17914# Centro Informazioni Studi Esperienze, Milan (Italy).
PHYSIOCHEMICAL TRANSFORMATION OF RADIOACTIVE NUCLEI IN WATER ENVIRONMENTS [TRASFORMAZIONE CHIMICO-FISICA DI RADIONUCLIDI NEL MEZZO AMBIENTE]
G. Ciceri 1985 27 p refs In ITALIAN Presented at Corso di Radioecologia degli Ambienti Acquatici Conference, Como, Italy, 10-14 Jun. 1985 Sponsored by Ente Nazionale per l'Energie Electricca
(CISE-2694) Avail: NTIS HC A03/MF A01

Experimental methods used to evaluate the environmental effects of radioactive water pollution are discussed and the theoretical prediction of the long term distribution is examined. The kinetics of the different physiochemical processes determines most of the environmental impact. For example, Co 60 is mostly associated with suspended particles and disappears from the water mass by sedimentation. Author (ESA)

N86-17915# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND SCHIPHOL AIRPORT (THE NETHERLANDS) IN 1981 [DE GELUIDSBELASTING ROND SCHIPHOL IN 1981]
J. F. W. Baarslag 4 May 1982 24 p refs In DUTCH
(Contract RB-RLD-82-4.1)
(NLR-TR-82034-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around an airport are presented. Airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours, and areas within are mapped. Author (ESA)

N86-17916# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Vliegtuigen.
NOISE ASSESSMENT AROUND ROTTERDAM AIRPORT (THE NETHERLANDS) IN 1981 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN ROTTERDAM IN 1981]
J. F. W. Baarslag 18 Jun. 1982 21 p refs In DUTCH
(Contract RB-RLD-82-4.1)
(NLR-TR-82059-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around an airport are discussed. The airport and its surroundings are projected on a flat reference surface, on which a network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using this information, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17917# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND SCHIPHOL AIRPORT (THE NETHERLANDS): INDICATIVE ZONES [GELUIDSBELASTING-BEREKENING VOOR DE LUCHTHAVEN SCHIPHOL: INDICATIEVE ZONES]
H. J. Poutsma 15 Sep. 1982 20 p refs In DUTCH
(Contract RB-RLD-82-5.2)
(NLR-TR-82090-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around an airport are presented. Airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17918# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND EELDE AIRPORT (THE NETHERLANDS): LEADING CONTOURS [GELUIDSBELASTINGBEREKENING VOOR DE LUCHTHAVEN EELDE: MAATGEVENDE CONTOUREN]
H. J. Poutsma 29 Oct. 1982 16 p refs In DUTCH
(Contract RB-RLD-82-5.2)
(NLR-TR-82111-U) Avail: NTIS HC A02/MF A01

Aircraft noise predictions around an airport for the year 2000 are presented. Airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17919# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND EELDE AIRPORT (THE NETHERLANDS) IN 1985 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN EELDE IN 1981]
J. F. W. Baarslag Dec. 1982 22 p refs In DUTCH
(Contract RB-RLD-84-4.1)
(NLR-TR-82135-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around the Eelde airport are presented. The airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minium distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are calculated. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17920# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Vliegtuigen.
NOISE ASSESSMENT AROUND ZUID-LIMBURG AIRPORT (THE NETHERLANDS) IN 1981 AND 1982 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN ZUID-LIMBURG IN 1981 EN 1982]
R. J. P. Dros and G. Bekebrede 31 Mar. 1983 26 p refs In DUTCH
(Contract RB-RLD-82/83-4.1)
(NLR-TR-83045-U) Avail: NTIS HC A03/MF A01

Aircraft noise assessment calculations around an airport are presented. Zuid-Limburg airport and its surrounding areas are projected onto a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these

data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolation between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17921# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.

NOISE ASSESSMENT AROUND SCHIPHOL AIRPORT (THE NETHERLANDS) IN 1982 [DE GELUIDSBELASTING ROND SCHIPHOL IN 1982]

J. F. W. Baarslag 26 Apr. 1983 22 p refs In DUTCH
(Contract RB-RLD-83-4.1)
(NLR-TR-83054-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around the Schiphol airport are presented. The airport and surroundings are projected ontp a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17922# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Vliegtuigen.

NOISE ASSESSMENT AROUND ROTTERDAM AIRPORT IN 1982 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN ROTTERDAM IN 1982]

J. F. W. Baarslag 1 Sep. 1983 23 p refs In DUTCH
(Contract RB-RLD-83-4.1)
(NLR-TR-83105-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around the Rotterdam airport are presented. The airport and its surroundings are projected onto a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are calculated. Using this information, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is determined in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17923# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.

DEPOSITION OF SULFUR IN EUROPE: METHODS TO CONSTRUCT UNBIASED SOURCE-RECEPTOR MATRICES FROM DATA OF A LIMITED PERIOD (1976 - 1982). A METEOROLOGICAL CONTRIBUTION TO THE IIASA REGIONAL ACIDIFICATION INFORMATION AND SIMULATION (RAINS) MODEL

Joop F. denTonkelaar 1985 63 p refs
(KNMI-TR-66; B8566383) Avail: NTIS HC A04/MF A01

Subjective and objective methods for the construction of annual, seasonal and monthly standard source receptor matrices (SRM) for an atmospheric submodel which describes the atmospheric transport of SO2 emissions from the source areas and the dry and wet depositions in the receptor places, on an annual basis, are described. The methods used data for a 5 yr period, in accordance with the long term climatic frequency distribution of atmospheric circulations. A proposal for the construction of SRM's for (atmospheric) favorable and unfavorable seasons, 6 and 12-month periods, to be informed about the possible variance in the values of the standard SRM's is made. Author (ESA)

N86-17924# Kema (N. V.), Arnhem (Netherlands). Dept. of Environmental Research.

MEASURING THE ELECTRIC FIELD IN THE ATMOSPHERE IN CONNECTION WITH INVESTIGATIONS ON THE DISPERSION OF AIR POLLUTION

J. H. A. vanWakeren, A. J. Elshout, L. H. J. M. Janssen, and A. J. vanLoon, ed. 1984 12 p refs Original contains color illustrations
(S/T-Rept-Vol-2-No-10; ISBN-90-355-0021-6; ISSN-0167-8590; B8564311) Avail: NTIS HC A02/MF A01

An instrument to measure the strength of the electric field in the atmosphere was developed. This E-field meter was installed on a mobile platform, e.g., an aircraft or a van, makes it possible to locate the position and establish the dimensions of a stack plume. The meter is light, requires very little energy and is not expensive. It can be used in a humid atmosphere with fog or rain because it functions as an ammeter instead of a voltmeter.
Author (ESA)

N86-17925# California Inst. of Tech., Pasadena. Environmental Quality Lab.

VISIBILITY MODEL VERIFICATION BY IMAGE PROCESSING TECHNIQUES Final Report, 25 Oct. 1982 - 31 Oct. 1984

S. M. Larson, G. R. Cass, K. J. Hussey, and F. Luce 31 Oct. 1984 105 p Sponsored by California State Air Resources Board, Sacramento
(PB85-222800; ARB-R-85-251) Avail: NTIS HC A06/MF A01 CSCL 13B

An image processing-based visibility model was applied to Los Angeles regional haze conditions, and methods were developed for testing the accuracy of this type of visibility modeling approach. An experimental program was executed in order to obtain a high quality set of the input data on aerosol properties and visual appearance required by the model. During the experiments, standard photographs were taken of chosen scenes on an extremely clean day and also under heavy smog conditions. The clean day image provides the substrate on which the visibility model calculations are performed. Pollutant properties measured on the heavy smog day are introduced into the model, and the results of the model calculations are displayed in the form of a synthetic photograph of the expected appearance of the heavy smog event. The synthetic smoggy image then is compared to a photograph taken of the actual smog event. Author

N86-17926# Environmental Protection Agency, Washington, D.C. Office of Acid Deposition, Environmental Monitoring, and Quality Assurance.

ACIDIC DEPOSITION PHENOMENON AND ITS EFFECTS: CRITICAL ASSESSMENT DOCUMENT Final Report

D. A. Bennett, R. L. Goble, and R. A. Linthurst Aug. 1985 182 p Prepared in cooperation with Clark Coll., Worcester, Mass., and N.C. State Univ., Raleigh
(PB85-233393; EPA-600/8-85-001) Avail: NTIS HC A09/MF A01 CSCL 06F

The Acidic Deposition Phenomenon and its Effects: Critical Assessment Document (CAD) is a summary, integration, and interpretation of the current scientific understanding of acidic deposition. It is firmly based upon The Acidic Deposition Phenomenon and its Effects: Critical Assessment Review Papers (CARP), PB85-100030 and PB85-100048, a multi-authored comprehensive critical review of the published scientific literature of the atmospheric phenomena and effects of acidic deposition, augmented by additional current scientific references. Evidence from disparate sections of the CARP are drawn together and interpreted. Reference is made, where possible, to CARP sections providing information for the CAD analyses; citations are made to additional references. Quotations and paraphrases of conclusions and observations from the CARP provide much of the material in the CAD. As such, they represent the conclusions of the CARP authors interpreted by the CAD authors. Some additional evidence has been developed by the CAD authors, and the conclusions drawn from this information are solely those of the CAD authors. GRA

N86-17927# California Univ., Riverside. Statewide Air Pollution Research Center.

ATMOSPHERIC FATES OF ORGANIC CHEMICALS: PREDICTION OF OZONE AND HYDROXYL RADICAL REACTION RATES AND MECHANISMS Final Report, Feb. 1982 - Feb. 1985

R. Atkinson, W. P. L. Carter, S. M. Aschmann, J. N. Pitts, and A.

M. Winer Aug. 1985 86 p
(PB85-241529; EPA-600/3-85-063) Avail: NTIS HC A05/MF A01 CSCL 07E

The kinetic, mechanistic and product data available in the literature for the gas phase reactions of OH radicals and of O3 with organic compounds were evaluated and reviewed. An experimental program was carried out to obtain needed kinetic data for selected OH radical and O3 reactions. The data and the experimental techniques used are summarized and a priori predictive techniques for the estimation of OH radical and O3 reaction rate constants for organics for which experimental data are not available are discussed.

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-17928*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
A STUDY OF TECTONIC ACTIVITY IN THE BASIN-RANGE PROVINCE AND ON THE SAN ANDREAS FAULT. NO. 1: KINEMATICS OF BASIN-RANGE INTRAPLATE EXTENSION Final Technical Report, 15 Apr. 1981 - 31 Jan. 1986
Paul K. Eddington, Robert B. Smith, and Casper Renggli (Eidgenoessische Technische Hochschule, Zurich, Switzerland) Jan. 1986 57 p refs Submitted for publication
(Grant NAG5-164)
(NASA-CR-176498; NAS 1.26:176498) Avail: NTIS HC A04/MF A01 CSCL 08G

Strain rates assessed from brittle fracture and total brittle-ductile deformation measured from geodetic data were compared to estimates of paleo-strain from Quaternary geology for the intraplate Great Basin part of the Basin-Range, western United States. These data provide an assessment of the kinematics and mode of lithospheric extension that the western U.S. Cordillera has experienced from the past few million years to the present. Strain and deformation rates were determined by the seismic moment tensor method using historic seismicity and fault plane solutions for sub-regions of homogeneous strain. Contemporary deformation in the Great Basin occurs principally along the active seismic zones. The integrated opening rate across the entire Great Basin is accommodated by E-E extension at 8 to 10 mm/a in the north that diminishes to NW-SE extension of 3.5 mm/a in the south. Zones of maximum lithospheric extension correspond to belts of thin crust, high heat flow, and Quaternary basaltic volcanism, suggesting that these parameters are related through mechanism of extension such as a stress relaxation, allowing bouyant uplift and ascension of magmas. Author

N86-17929*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
A STUDY OF TECTONIC ACTIVITY IN THE BASIN-RANGE PROVINCE AND ON THE SAN ANDREAS FAULT. NO. 2: LITHOSPHERIC STRUCTURE, SEISMICITY, AND CONTEMPORARY DEFORMATION OF THE UNITED STATES CORDILLERA Final Technical Report, 15 Apr. 1981 - 31 Jan. 1986
Robert B. Smith Jan. 1986 87 p refs Submitted for publication
(Grant NAG5-164)
(NASA-CR-176499; NAS 1.26:176499) Avail: NTIS HC A05/MF A01 CSCL 08G

The structural evolution of the U.S. Cordillera has been influenced by a variety of tectonic mechanisms including passive margin rifting and sedimentation; arc volcanism; accretion of exotic terranes; intraplate magmatism; and folding and faulting associated with compression and extension processes that have profoundly influenced the lithospheric structure. As a result the Cordilleran crust is laterally inhomogeneous across its 2000 km east-west breadth. It is thin along the West Coast where it has close oceanic affinities. The crust thickens eastward beneath the Sierra Nevada, then thins beneath the Basin-Range. Crustal thickening continues eastward beneath the Colorado Plateau, the Rocky Mountains, and the Great Plains. The total lithospheric thickness attains 65 km in the Basin-Range and increases eastward beneath the Colorado Plateau. The upper-crust, including the crystalline basement of the Cordillera, has P sub G velocities of 6 km/s in the Basin-Range and Rio Grande Rift. Lower P sub G velocities of 5.4 to 5.7 km/s are associated with the youthful Yellowstone, Valles and Long Valley calderas and the Franciscan assemblage of the western coastal margin. Averaged crustal velocity reflects integrated tectonic evolution of the crust-thick silicic bodies, velocity reversals, and a thin crust produce low averaged velocities that are characteristic of a highly attenuated and thermally deformed crust. Author

N86-17930*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
A STUDY OF TECTONIC ACTIVITY IN THE BASIN-RANGE PROVINCE AND ON THE SAN ANDREAS FAULT. NO. 3: KINEMATICS OF GREAT BASIN INTRAPLATE EXTENSION FROM EARTHQUAKE, GEODETIC AND GEOLOGIC INFORMATION Final Technical Report, 15 Apr. 1981 - 31 Jan. 1986 M.S. Thesis
Paul Kendall Eddington Jan. 1986 275 p refs
(Grant NAG5-164)
(NASA-CR-176500; NAS 1.26:176500) Avail: NTIS HC A12/MF A01 CSCL 08G

Strain rates assessed from brittle fracture, associated with earthquakes, and total brittle-ductile deformation measured from geodetic data were compared to paleostrain from Quaternary geology for the intraplate Great Basin of the western United States. These data provide an assessment of the kinematics and mode of lithospheric extension that the western U.S. Cordillera has experienced in the last 5 to 10 million years. Strain and deformation rates were determined by the seismic moment tensor method using historic seismicity and fault plane solutions. Contemporary deformation of the Great Basin occurs principally along the active seismic zones. The earthquake related strain shows that the Great Basin is characterized by regional E-W extension at 8.4 mm/a in the north that diminishes to NW-SE extension of 3.5 mm/a in the south. Zones of maximum extension correspond to belts of shallow crust, high heat flow, and Quaternary basaltic volcanism, suggesting that these parameters are related through an effect such as a stress relaxation allowing bouyant uplift and ascension of magmas. Author

N86-17931# Royal Aircraft Establishment, Farnborough (England).
THE EARTH'S ATMOSPHERE: IDEAS OLD AND NEW
D. G. King-Hele 19 Apr. 1985 42 p refs Previously announced in IAA as A85-49748
(RAE-TM-SPACE-351; BR96188) Avail: NTIS HC A03/MF A01

The modern view of the Earth's atmosphere, and past ideas between 350 BC and 1925 AD are surveyed. Author (ESA)

N86-17932# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
ROCK FAILURE CRITERIA FOR DESIGN OF UNDERGROUND STRUCTURAL SUPPORTS Final Report, for 1984 - 1985
G. A. Nicholson Sep. 1985 44 p
(DA Proj. 4A1-61101-A-91-D)
(AD-A159807; WES/MP/GL-85-19) Avail: NTIS HC A03/MF A01 CSCL 13/13

This report describes an empirical constitutive model for underground excavations in rock which equates the deformation modulus to the ratio of the deviator stress to axial strain. The model requires failure criteria which define both the deviator stress at failure and strain at failure. Available failure criterion allows reasonable estimates of deviator stress for intact rock as well as rock mass. However, a failure criterion for estimating strains at failure for rock does not exist. Thus, this report examines the feasibility of developing a strain-based failure criterion for rock. Stress-strain responses for two rock types, sandstone and granite, were evaluated. Reasonable correlations were found to exist

between axial strain at failure normalized with respect to unconfined compressive axial strain at failure and the following: (1) maximum shear stress normalized with respect to the unconfined compressive strength; and (2) minor principal stress (confining stress) normalized with respect to the unconfined compressive strength.

Author (GRA)

N86-17933# Royal Norwegian Council for Scientific and Industrial Research, Kjeller.

THE NORWEGIAN SEISMIC ARRAY (NORSAR) Semiannual Technical Summary, 1 Oct. 1984 - 31 Mar. 1985

L. B. Loughran Jul. 1985 123 p

(Contract F08606-84-C-0002; ARPA Order 1483)

(AD-A159820; NORSAR-CONTRIB-354) Avail: NTIS HC A06/MF A01 CSCL 08/11

During this reporting period the Norwegian Seismic Array (NORSAR) Detection Processing System operated with an average uptime of 98.2%. A total of 1792 seismic events were reported by NORSAR in the period. Preliminary evaluation of the real time detection system for the NORESS array has shown an excellent P-wave detection performance at high signal frequencies. Such frequencies are commonly observed for all seismic events at regional distances, and for many teleseismic events, especially in Eurasia. The detection of secondary regional phases (Sn and Lg), which is important for the location procedure in the NORESS system, needs further refinement. A newly developed off-line interactive analysis package was applied to study in detail a NORESS data base of 18 regional events from Western Russia, and this study has shown that estimates of azimuth and phase velocity using F-k analysis are quite strongly dependent on the analysis frequency selected. A newly developed broadband spectral estimation technique gives promise of more stable estimates. Studies of travel time residuals using GSDN network data for both deep and shallow events indicated that the reference earth model needs to be modified, both with regard to the upper and lower mantle. A study of teleseismic P coda using NORSAR and NORESS data has given evidence to confirm the hypothesis that the coda is composed of on-azimuth P and off-azimuth Lg, the former being due to scattering of Lg to P near the source and the latter being due to scattering to P to Lg near the receiver. GRA

N86-17934# Lawrence Livermore National Lab., Calif.

AN APPROACH TO THE QUANTIFICATION OF SEISMIC MARGINS IN NUCLEAR POWER PLANTS

R. J. Budnitz, P. J. Amico, C. A. Cornell, W. J. Hall, R. P. Kennedy, J. W. Reed, and M. Shinozuka Aug. 1985 303 p

(TI85-017151; UCID-20444; NUREG/CR-4334) Avail: NTIS HC A14/MF A01

This report is the second report of the Expert Panel on Quantification of Seismic Margins. The objective of this report is to discuss progress to date in studying the issue of quantification of seismic margins in nuclear power plants. In particular, it deals with progress towards the establishment of review guidelines that would be useful in studying how much seismic margin exists. The guidelines themselves will be the subject of the next Panel report. The work presented in this report is the result of a detailed study of seismic Probabilistic Risk Assessments, historical earthquake performance of the nuclear and non-nuclear facilities, and test data, augmented by the individual experience and expertise of the Panel members. The major development discussed in this report is the HCLPF concept, which demonstrates margin by showing that there is a High Confidence of a Low Probability of Failure for a given earthquake size. DOE

N86-17935# Pacific Northwest Lab., Richland, Wash.

ADVANCED TECHNIQUES FOR LITHOLOGIC AND FRACTURE ANALYSIS UTILIZING THEMATIC MAPPER AND TOPOGRAPHIC DATA

H. P. Foote, R. L. Thiessen, J. R. Eliason, and G. E. Wukelic Jun. 1985 12 p refs Presented at the NASA LIDQU Final Symposium: LANDSAT Image Data Quality Analysis Meeting, Indianapolis, Ind., 9 Sep. 1985 Prepared in cooperation with Washington State Univ., Pullman

(Contract DE-AC06-76RL-01830)

(DE85-018220; PNL-SA-13290; CONF-8509161-2) Avail: NTIS HC A02/MF A01

Under the LIDQA program, the Pacific Northwest Laboratory has been evaluating selected energy-related applications of the LANDSAT Thematic Mapper (TM) data from a user-agency perspective. This paper describes techniques that have been developed to correct for topographic-induced shading on TM surface reflectance and to perform topographic analysis to define crustal fracture zones as aids to geologic studies. These techniques require the use of only digital terrain and TM data. The analysis techniques have been successfully applied to the Paiute Ridge Quadrangle in Nevada, demonstrating the utility of the techniques for geologic studies. DOE

N86-17936# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.

NORTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT, VOLUME 1 Final Report

Aug. 1985 345 p

(Contract DE-AC02-83CH-10139)

(DE86-000406; DOE/CH-7(1)-Final) Avail: NTIS HC A15/MF A01

This report presents available geologic information pertinent to siting a repository for high-level nuclear waste in crystalline rock in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. For each of the states within the Northeastern Region, information is provided on the geologic disqualifying factor and the geologic regional screening variables to be used in region-to-area screening. The geologic factor and variables include deep mines and quarries, rock mass extent, postemplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, major ground-water discharge zones, ground-water resources, state of stress, thickness of rock mass, and thickness of overburden. Information is presented on age, areal extent, shape, composition, texture, degree and type of alteration, thickness, and structural features associated with each rock body or complex. Regional seismic and tectonic information is presented, including patterns of earthquake occurrence, earthquake magnitudes, horizontal ground accelerations, and vertical crusal movements. Also included are discussions of the rock and mineral deposits or mines located within or near crystalline bodies; ground-water resources and regional hydrology; postulated changes in climate and the associated effects; and landforms, surface processes, and surficial materials on or near the rock bodies. A discussion is also presented on the relationship between the US Department of Energy (DOE) Siting Guidelines (10 CFR 960) and the geologic disqualifying factor and regional screening variables to be used in the region-to-area screening process. DOE

N86-17937# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.

NORTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 2: APPENDIXES Final Report

Aug. 1985 333 p Document includes a Microfiche supplement

(Contract DE-AC02-83CH-10139)

(DE86-000408; DOE/CH-7(2)-Final) Avail: NTIS HC A01

This report presents available geological information pertinent to sitting a repository for high-level nuclear waste in crystalline rock in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. For each of the states within the Northeastern Region, information is provided on the geologic disqualifing factor and the geologic regional screening variables to be used in region-to-area screening. The geologic factor and variables include deep mines and quarries, rock mass extent, postemplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, major ground-water discharge zones, ground-water resources, state of stress, thickness of rock mass, and thickness of overburden. Volume (2) of this report contain three appendices: Summary of Rock Body Characteristics; Glossary; and Mineral Resources Data. DOE

N86-17938# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
NORTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 3: PLATES Final Report
Aug. 1985 120 p
(Contract DE-AC02-83CH-10139)
(DE86-000418; DOE/CH-7(3)-Final) Avail: NTIS HC A06/MF A01

This report presents available geologic information pertinent to siting a repository for high-level nuclear waste in crystalline rock in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. For each of the states within the Northeastern Region, information is provided on the geologic disqualifying factor and the geologic regional screening variables to be used in region-to-area screening. The geologic factor and variables include deep mines and quarries, rock mass extent, postemplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, state of stress, thickness of rock mass, and thickness of overburden. Volume 7(3) contains the following maps: index map; faults, ground acceleration, and in situ stress; rock and mineral resources; drainage basins and ground water discharge zones; ground water resources; and crystalline rock bodies. DOE

N86-17939# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
NORTH CENTRAL REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 2: PLATES Final Report
Aug. 1985 165 p
(Contract DE-AC02-83CH-10139)
(DE86-000419; DOE/CH-8(2)-Final) Avail: NTIS HC A08/MF A01

Volume 8(2) contains the following maps: Geologic map of the Lake Superior Region (Minnesota, Wisconsin, and northern Michigan); Index Map; Overburden Thickness; Faults and Ground Acceleration; Rock and Mineral Resources; Ground Water Basins and Potential Major Discharge Zones; and Ground Water Resource Potential. DOE

N86-17940# Sandia National Labs., Albuquerque, N. Mex.
MULTIWELL EXPERIMENT GEOPHYSICS PROGRAM Final Report
C. A. Searls Sep. 1985 72 p refs
(Contract DE-AC04-76DP-00789)
(DE86-001147; SAND-85-1013) Avail: NTIS HC A04/MF A01

Two Vertical Seismic Profile experiments and a Three-Dimensional Surface Seismic experiment were conducted at the Multiwell Experiment site in central Colorado to assess the applicability of seismic methods to mapping lenticular sand bodies of the Mesaverde group in the Piceance Basin. The data from these experiments were analyzed in conjunction with synthetic seismograms computed from well logs and additional geological data. This analysis demonstrated that the producing zones can be delineated once the seismic character of these zones is determined but the morphology of individual sand lenses cannot be mapped at the Multiwell Experiment site. Additionally, the extended vertical seismic profile technique was demonstrated to provide a very high resolution seismic technique for investigation of the region adjacent to an existing well. DOE

N86-17941# Kiruna Geophysical Inst. (Sweden).
GENERATION OF MAGNETIC FIELD ALIGNED CURRENTS, PARALLEL ELECTRIC FIELDS, AND INVERTED-V STRUCTURES BY PLASMA PRESSURE INHOMOGENEITIES IN THE MAGNETOSPHERE
K. Stasiewicz Dec. 1984 36 p refs Submitted for publication
(KGI-Preprint-073; ISSN-0349-2656) Avail: NTIS HC A03/MF A01

Magnetic field aligned currents driven by plasma pressure inhomogeneities (plasma clouds) in the distant magnetosphere are analyzed. A parallel potential drop is found to be established in the upward current region whenever a spatial scale for the pressure gradient in the equatorial magnetosphere is $< 3goBi/Bo$, where go is a hot electron gyroradius in the equatorial magnetic field Bo, and Bi is the magnetic induction in the ionosphere. A theoretical derivation is given for the experimentally observed linear relation $T=AEp+To$ between the characteristic energy T of precipitating magnetospheric electrons and the peak energy Ep in inverted-V electron spectra. Three-dimensional potential structures accelerating electrons earthward are shown to be established beneath model clouds which could correspond to a large scale inverted-V structure and to a thin (1 km) auroral arc. Author (ESA)

N86-17942# Kiruna Geophysical Inst. (Sweden).
GENERATION OF MAGNETOSPHERIC RADIATION BY DECAY OF BERNSTEIN WAVES
Kjell Roennmark Jan. 1985 16 p refs
(KGI-Preprint-076; ISSN-0349-2656) Avail: NTIS HC A02/MF A01

The generation of nonthermal continuum radiation in the equatorial magnetosphere by nonlinear decay of electrostatic Bernstein waves with frequency near the upper hybrid frequency is considered. A decay process does not require the low frequency waves to be linearly unstable, which is compatible with the difficulties of observing low frequency turbulence associated with sources of myriametric radiation. Coalescence processes in practice are always incoherent, but a nonlinear decay can be coherent. The appearance of very narrow bands in the radiated spectrum can thus be explained by a decay process. A decay should be comparable to a coalescence process in terms of efficiency, but accurate estimates of the radiated power require theoretical work, based on good observations of particle distributions and wave spectra in the sources of myriametric radiation. Author (ESA)

N86-17943# Kiruna Geophysical Inst. (Sweden).
BOUNDARY LAYER PLASMAS AS A SOURCE FOR HIGH-LATITUDE, EARLY AFTERNOON, AURORAL ARCS
Rickard Lundin and David S. Evans (Space Environment Lab., Boulder, Colo.) Feb. 1985 44 p refs
(KGI-Preprint-079; ISSN-0349-2656) Avail: NTIS HC A03/MF A01

Simultaneous measurements of hot boundary layer plasma from PROGNOZ-7 and particle precipitation from the TIROS/NOAA satellite in nearly magnetically conjugate regions were used to study the dynamo process responsible for the formation of high latitude, early afternoon, auroral arcs. In PROGNOZ-7 observations in the dayside boundary layer at high latitudes, regions with injected magnetosheath plasma embedded in a halo of antisunward flowing magnetosphere plasma are frequent. Analysis of the injected magnetosheath plasma indicates that it also acts as a local source of EMF in the boundary layer. The process resembles that of a local MHD dynamo driven by the excess drift velocity of the injected magnetosheath plasma relative to the background magnetospheric plasma. It is shown that the large-scale morphology and the data intercomparison between PROGNOZ-7 and TIROS-N agree well with a local injection of magnetosheath plasma into the dayside boundary layer as the main dynamo process powering the auroral arcs. Author (ESA)

N86-17944# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
A METHOD FOR ESTIMATING ATMOSPHERIC STABILITY USING SODAR MEASUREMENTS
Lennart Thaning Apr. 1985 44 p refs In SWEDISH; ENGLISH summary
(FOA-E-40020) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

As a basis for calculating the atmospheric scattering of dangerous emissions, a method was developed using horizontal wind and standard deviation of the vertical wind fluctuations at 75 m height, measured by a triaxial Doppler sodar at the meteorological tower of a nuclear power plant. The stability scheme is uncertain at low wind speed due to the vertical standard deviation, interpreted as instrumental noise. Results obtained during the study indicate that this meteorological tower is situated too close

to the shore line to produce satisfactory results with on-shore wind when the sea and land temperature differ. Author (ESA)

N86-17945# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Infrarottechnik.
SOME ASPECTS OF THE ATMOSPHERIC RADIANCE MODEL OF LOWTRAN 6
Rudolf Richter May 1985 24 p refs
(DFVLR-FB-85-33; ISSN-0171-1342) Avail: NTIS HC A02/MF A01; DFVLR, Cologne, West Germany DM 9.50

Two radiance models within LOWTRAN 6 are compared: the zero-order scattering, as implemented in standard LOWTRAN, and the conservative scattering algorithm. The comparison is performed for horizontal and slant atmospheric paths in infrared window regions 3 to 5 microns and 8 to 14 microns. For paths of high optical depth the zero-order scattering model underestimates the atmospheric background radiation. The effect depends on the spectral region and the visibility. It is shown that an artifact, the radiance dip near the 90 deg zenith angle for slant paths from ground to space, does not occur in the conservative scattering model. Author (ESA)

N86-17946# Danish Space Research Inst., Lyngby.
WAVES WITH HARMONIC STRUCTURE BELOW AND ABOVE THE LOWER HYBRID RESONANCE (LHR) OBSERVED ON THE CLEFT ENERGETICS TRANSPORT AND ULTRAVIOLET RADIATION (CENTAUR) 35.001 AND 35.002 ROCKETS
T. Neubert, G. Holmgren (Uppsala Ionospheric Observatory, Sweden), E. Ungstrup, and K. Melgaard Mar. 1985 37 p refs Sponsored by Danish Space Board and Swedish Board for Space Activities
(DRI-2-85; ISSN-0109-6605) Avail: NTIS HC A03/MF A01

Measurements obtained from 0 to 10 kHz electric wave and 0 to 4.2 kHz electron density fluctuation rocket experiments are presented. Narrow banded signals with harmonic structure related to the proton gyrofrequency are observed below and above the lower hybrid frequency, from 2 to 10 kHz, modulated in frequency during a rocket spin typically by 2 kHz. The signals are generated by the presence of the payload in the plasma. The source of free energy remains unidentified, but may be a perpendicular ion beam emitted by or created by the presence of the payload, generating flute mode ion cyclotron harmonic waves. Bursts of harmonic waves are received below 2 kHz. The fundamental frequency of these emissions varies over a range from 47 to 700 Hz and is rarely at any of the characteristic frequencies of the plasma. Waves with a lower cutoff at the lower hybrid frequency are observed. The lower hybrid frequency estimated from magnetic field and density measurements and from the wave measurements agrees within 6% (500 Hz). Author (ESA)

N86-17947# National Geophysical Data Center, Boulder, Colo.
NATIONAL GEOPHYSICAL DATA CENTER Annual Report, fiscal year 1984
J. Coffman 1985 67 p
(PB85-248458) Avail: NTIS HC A04/MF A01 CSCL 05A

The first Annual Report prepared by NOAA's National Geophysical Data Center (NGDC) is presented. The topics covered include the following: (1) the national geophysical data center, (2) solar-terrestrial physics, (3) solid earth geophysics, (4) marine geology and geophysics; (5) national snow and ice data center; (6) support services; (7) fiscal year 1984 publications. GRA

N86-17948# Illinois State Geological Survey, Champaign.
SOURCES OF INFORMATION ON ENGINEERING GEOLOGY AND RELATED TOPICS FOR NORTHEASTERN ILLINOIS
W. G. Dixon 1985 25 p
(PB85-241933; IL/SGS/EGN-110) Avail: NTIS HC A02/MF A01 CSCL 08G

In 1964 the Engineering Geology Committee of the Soil Mechanics and Foundations Division of the Illinois Section of American Society of Civil Engineers prepared a Preliminary List of Sources of Information Covering Engineering Geology and Related Subjects for the Chicago Area. In 1972 the list was revised. Because more information has become available, the format of the list was changed for this revision. The addresses of all suppliers of information are now grouped together; new categories of information are added; and fewer individual publications are cited in lieu of lists of publications. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-17949 Engineering Sciences Data Unit, London (England).
WIND SPEED PROFILES OVER TERRAIN WITH ROUGHNESS CHANGES FOR FLAT OR HILLY SITES
Mar. 1985 64 p refs Submitted for publication
(ESDU-84011-A; ISBN-0-85679-473-2; ISSN-0141-4003) Avail: ESDU

ESDU 84011 provides a simplified method of estimating the variation of design wind speed (mean-hourly or gust values) with height above the ground and with terrain roughness. The data for flat terrain (which are based on relationships given in ESDU 82026 and 83045) are presented in the form of tables giving a factor (K) by which a reference wind speed at 10 m over open country terrain must be multiplied to give the wind speed at the required height over the site in question. K-factors are provided for a range of heights up to 400 m, gust averaging times and combinations of terrain roughness at the site with a single change in roughness at varying distances upwind of the site. It is also shown how the tabulated data can be used to generate wind speed profile data for multiple changes in terrain roughness. Additional data provide a wind speed correction for sites on hills, cliffs or escarpments. A program listing is included for repetitive calculations which gives wind speed profiles for multiple roughness changes and for flat or hilly sites. Author

N86-17950# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F: RICHARDS-GEBAUR AFB, MISSOURI Data Summary Report, May 1975 - Apr. 1984
Jul. 1985 379 p
(AD-A159602; USAFETAC/DS-85/041) Avail: NTIS HC A17/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Richards-Gebaur AFB, Missouri is presented. This report is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B Precipitation is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using The Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-17951# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F: MAXWELL AFB, ALABAMA Data Summary Report, Mar. 1975 - Feb. 1985
Jun. 1985 329 p
(AD-A159603; USAFETAC/DS-85/025) Avail: NTIS HC A15/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Maxwell AFB, Alabama is presented. This report is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather

observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-17952# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY LISOCS. GILZE-RIJEN, NETHERLANDS Data Summary Report, Apr. 1975 - Mar. 1985

5 Aug. 1985 403 p

(AD-A159863; USAFETAC/DS-85/042) Avail: NTIS HC A18/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Glize-Rijen, Netherlands is presented. This summary similar to the revised uniform summary of surface weather observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: (1) weather conditions and atmospheric phenomena; (3) surface winds; (4) ceiling and visibility; (5) Psychrometric Summaries; and (6) pressure summaries. Note that part (2) precipitation, is omitted. See USAFETAC/TN-83/001(AD-A132186), an aid for using the revised uniform summary of surface weather observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-17953# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS, SPARREVOHN AFS, ALASKA Data Summary Report, Dec. 1976 - Nov. 1984

18 Sep. 1985 304 p

(AD-A159864; USAFETAC/DS-85/046) Avail: NTIS HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Sparrevohn AFS, Alaska is presented. The summary consists of: (1) weather conditions and atmospheric phenomena; (2) precipitation; (3) surface winds; (4) Ceiling and Visibility; (5) psychrometric summaries; and (6) pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the revised uniform summary of surface weather observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-17954# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS, PEASE AFB, NEW HAMPSHIRE Data Summary Report, Mar. 1975 - Feb. 1985

5 Jul. 1985 480 p

(AD-A159865; USAFETAC/DS-85/026) Avail: NTIS HC A21/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Pease AFB, New Hampshire is presented. The summary consists of: (1) weather conditions and atmospheric phenomena; (2) precipitation; (3) surface winds; (4) ceiling and visibility; (5) psychrometric summaries; and (6) pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An aid for using the revised uniform summary of surface weather observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-17955# Naval Postgraduate School, Monterey, Calif.

ASSESSMENT OF THE PERFORMANCE OF AN IN-FIELD GAUSSIAN PLUME/PUFF MODEL FOR OVERWATER USE Report, for Sep. 1983 - Oct. 1984

C. E. Skupniewicz and G. E. Schacher Nov. 1984 55 p

(AD-A160032; NPS61-85-002) Avail: NTIS HC A04/MF A01 CSCL 15/2

A chemical hazard forecast computer model is tested for consistency with field data which was used in its development. The model's attempt to forecast puff dispersion, for which a parameterization has not been developed, are examined by comparison to relative dispersion data sets. The parameterizations developed from the NPS data set are compared to an independently derived set of parameterizations demonstrating the generic applicability of the model. It was found that the model predicts the total width over which a hazard might occur reasonably well but underpredicts the downwind hazard distance. This is due to lack of separate consideration of meander effects. GRA

N86-17956# Lawrence Livermore National Lab., Calif.

FORWARD AND BACKWARD TRAJECTORIES USING GRANTOUR: A PRELIMINARY STUDY FOR ARCTIC TRAJECTORIES

A. Tan, J. J. Walton, and M. C. MacCracken Aug. 1985 15 p

(Contract W-7405-eng-48)

(DE85-017875; UCID-20513) Avail: NTIS HC A02/MF A01

Traditional air trajectory models utilize various constant-pressure trajectory methods, known as isobaric trajectory models, although it has been recognized that isentropic trajectories would be more accurate when large temperature gradients are encountered. This study reports calculations of forward and backward trajectories using the LLNL GRANTOUR transport model. This model accounts for the vertical transport disregarded in the isobaric methods and accurately transports smoke with the three-dimensional wind field. Preliminary findings indicate that GRANTOUR trajectories, which actually follow the true parcel trajectory, are generally consistent with those obtained by the isentropic method, at least in the Arctic. DOE

N86-17957# Lawrence Livermore National Lab., Calif.

NATURAL PHENOMENA HAZARDS MODELING PROJECT. EXTREME WIND/TORNADO HAZARD MODELS FOR DEPARTMENT OF ENERGY SITES. REVISION 1

D. W. Coats and R. C. Murray Aug. 1985 74 p refs

(Contract W-7405-eng-48)

(DE85-018156; UCRL-53526-Rev-1) Avail: NTIS HC A04/MF A01

Lawrence Livermore National Laboratory (LLNL) has developed seismic and wind hazard models for the Office of Nuclear Safety (ONS), Department of Energy (DOE). The work is part of a three-phase effort aimed at establishing uniform building design criteria for seismic and wind hazards at DOE sites throughout the United States. This report summarizes the final wind/tornado hazard models recommended for each site and the methodology used to develop these models. Final seismic hazard models have been published separately by TERA Corporation. In the final phase, it is anticipated that the DOE will use the hazard models to establish uniform criteria for the design and evaluation of critical facilities. DOE

N86-17958# World Meteorological Organization, Geneva (Switzerland).

WORLD WEATHER WATCH: ON IMPLEMENTATION Status Report

1984 135 p refs

(WMO-639; ISBN-92-63-10639-8; SR-12) Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 25

The status of the World Meteorological Organization's Global Observing System, Global Data Processing System, and Global Telecommunication System is summarized. Monitoring of the operation of the World Weather Watch and Operational Information Service is reviewed. Author (ESA)

N86-17959# World Meteorological Organization, Geneva (Switzerland).

[ACTIVITIES REPORT IN WORLD METEOROLOGY] Annual Report, 1984

1985 234 p refs

(WMO-644; ISBN-92-63-10644-4) Avail: NTIS MF A01; print copy

available at WMO, Geneva

The status of the World Meteorological Organization's programs is reviewed. The World Weather Watch; World Climate Program; Research and Development Program; Applications of Meteorology Program; Hydrology and Water Resources Program; Education and Training; Technical Cooperation Program; regional activities; and external relations, and legal and administrative matters are covered. Author (ESA)

N86-17960# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

CHARACTERIZATION OF THE ELECTROMAGNETIC RADIATION PRECEDING LIGHTNING Ph.D. Thesis - Paris 6 Univ.

J. P. Moreau 1985 153 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-954)
(ONERA-NT-1985-1; ISSN-0078-3781) Avail: NTIS HC A08/MF A01

The static field variations and very high frequency radiation during the preliminary breakdown and stepper leader phases before the first return stroke of lightning are studied. Experimental data suggest that radiation is pulsed, and that extremely short pulses of a few nanosec exist, giving evidence of a spectrum with significant values in the VHF range. The VHF/UHF analysis yields fruitful information on the discharge, its initiation, its development and the physical processes involved at the head of the channel. Author (ESA)

N86-17961# Groningen Rijksuniversiteit (Netherlands). Vakgroep Systeem- en besliskunde.

PREDICTING WINDSPEED: A SYSTEM THEORETICAL APPROACH [VOORSPELLEN VAN WINDSNELHEDEN: EEN SYSTEEMTHEORETISCHE BENADERING]

Mark Geerts Jan. 1984 107 p refs In DUTCH: ENGLISH summary
(Rept-49) Avail: NTIS HC A06/MF A01

Wind predictors using system and control theory models were developed to solve integration problems of possibly strongly fluctuating windpower within a national electric power system. A Kalman filter and an autoregressive moving average predictor are compared with literature values. The one dimensional models deployed are too simple, but better results are possible with multidimensional models. Author (ESA)

N86-17962# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.

ON-LINE SUPERPOSITION OF GEOGRAPHICAL DATA TO TIROS-N TYPE METEOROLOGICAL SATELLITE IMAGES

R. G. vanPopta 1985 44 p refs
(NLR-TR-82133-U; B8568393) Avail: NTIS HC A03/MF A01

A method by which geographical data are superposed in real time to the high resolution picture transmission imagery from the TIROS-N series satellites is described. The superposition of additional geographical data is important for an accurate position determination of image data. Computations necessary for the transformation, conversion, and sorting of the additional data are performed on-line (i.e., during a period of 5 min immediately before image production). The superposition is based on orbit predictions with a circular model, modified to decrease the geographical data position deviations in the image. Author (ESA)

N86-17963# Pacific Northwest Lab., Richland, Wash.

HANFORD 1964 ATMOSPHERIC BOUNDARY LAYER EXPERIMENT: MICROMETEOROLOGICAL AND TRACER DATA ARCHIVE. SET 002 DOCUMENTATION REPORT Final Report

C. S. Glantz, R. K. Woodruff, and J. G. Droppo Aug. 1985 25 p ref
(Contract EPA-68-02-4063)
(PB85-243145; EPA-600/3-85-055) Avail: NTIS HC A02/MF A01 CSCL 13B

An archive for micrometeorological and tracer dispersion data has been developed by Battelle, Pacific Northwest Laboratories for the U.S. Environmental Protection Agency. The archive is designed to make the results of extensive field tests readily accessible to EPA for model testing, development, and verification efforts. This report provides documentation for one of the archived data sets, the Hanford 1964 Atmospheric Dispersion Experiment. The aim of this effort is to archive invaluable data sets in a timely fashion before the necessary supporting information about the data becomes lost forever. The entries in this documentation report are as follows: data set fact summary, a narrative description of experiment and data, special information, references, a description of archive data files, contacts (names, addresses, and phone numbers) and standard experiment summary table. Author (GRA)

N86-17964# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.

INSTALLATION OF AUTOMATED WEATHER OBSERVING SYSTEMS BY FAA (FEDERAL AVIATION ADMINISTRATION) AT COMMERCIAL AIRPORTS IS NOT JUSTIFIED

29 Jul. 1985 40 p
(PB85-241347; GAO/RCED-85-78; B-21770) Avail: NTIS HC A03/MF A01 CSCL 04B

Current surface weather observations at commercial airports which use equipment to measure or estimate nine weather elements meet or exceed the Federal Aviation Administration's (FAA's) operational requirements. These requirements are considered essential to provide airport and area aviation weather forecasts required by law and federal aviation regulations and are important in maintaining aviation safety at commercial airports. As part of its National Airspace System plan to automate air traffic control facilities in the United States by the year 2000, FAA plans to install 304 automated weather observing systems (AWOSs) costing $60 million at commercial airports across the country. It is found that AWOS performance does not meet FAA's operational requirements for four weather elements and is not cost-effective at commercial airports compared with the existing observer system. GRA

N86-17965# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

QUERY LANGUAGE FOR THE PROFILER DATA SYSTEM

V. J. Yaplee Boyle Jun. 1985 210 p
(PB85-240190; NOAA-TM-ERL-WPL-125) Avail: NTIS HC A10/MF A01 CSCL 04B

A set of atmospheric measuring instruments were developed. The atmospheric measuring instruments are called Profilers. Data from Profilers around the state of Colorado are brought back to a central computer. There was no user friendly interface for nonprogrammers as well as programmers to access Profiler data. It is believed that a query language is a useful utility to make available to users. An interpreter was developed to interface the user with the Profiler data base. The goal of the Interpreter developed is to allow flexibility and make it easy and natural to use for any users with any level of computer expertise. GRA

N86-17966# National Environmental Satellite Service, Washington, D. C.

MONTHLY INFRARED IMAGERY ENHANCEMENT CURVES: A TOOL FOR NIGHTTIME SEA FOG IDENTIFICATION OFF THE NEW ENGLAND COAST

E. M. Maturi and S. J. Holmes May 1985 45 p
(PB85-237725; NOAA-TM-NESDIS-12) Avail: NTIS HC A03/MF A01 CSCL 04B

Detection of nighttime sea fog is possible by using enhanced infrared imagery and a pattern recognition technique. Enhancement curves were developed to delineate minimal temperature differences in the sea surface and sea fog cloud top temperature ranges. Monthly enhancement curves for the months April through October are presented. GRA

N86-17967# National Weather Service, Salt Lake City, Utah.

AOS (ADVANCED OPERATING SYSTEM) GRAPHIC TO GRID POINT CONVERSION AND DEPARTURE FROM NORMAL PROGRAMS

J. L. Anderson and M. A. Mathewson Aug. 1985 50 p
(PB85-248110; NOAA-NWS-WRCP-50) Avail: NTIS

HC A03/MF A01 CSCL 04B

The programs DEPART and GRIDNH are described. The GRIDNH produces files of gridded 500mb height data from AFOS graphics, while DEPART is used to produce the MRF departure from normal charts on AFOS. The departure from normal charts have already proved to be quite useful in an operational forecasting environment. The charts help forecasters to determine what global height features are the results of climatologically favored locations and which are true anomalies; in this way the departure charts facilitate the use of teleconnections. GRA

N86-17968# National Center for Atmospheric Research, Boulder, Colo.
UNCORRELATED NOISE IN TURBULENCE MEASUREMENTS
D. H. Lenschow and L. Kristensen May 1985 62 p Sponsored by NSF
(PB85-212314; NCAR/TN-254+STR) Avail: NTIS HC A04/MF A01 CSCL 04B

The error variance contributed by random, uncorrelated measurement noise can be merged with the error variance contributed by real variations in the atmosphere to obtain a single expression for the total error variance when the sampling time is much less than the integral scale of atmospheric variability. It is assumed that the measured signal is a representation of a variable that is continuous on the scale of interest in the atmosphere. The modeling results are confirmed by artificially modifying a test time series with Poisson noise and comparing the statistics from ten realizations of the modified series with the predicted error variances. GRA

N86-17896# Riso National Lab., Roskilde (Denmark).
ATMOSPHERIC BOUNDARY LAYER MODELING
N. O. Jensen *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 77 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17897# Nuclear Energy Centre, Mol (Belgium).
SENSITIVITY, APPLICABILITY AND VALIDATION OF BI-GAUSSIAN OFF- AND ON-LINE MODELS FOR THE EVALUATION OF THE CONSEQUENCES OF ACCIDENTAL RELEASES IN NUCLEAR FACILITIES Final Report
J. G. Kretzschmar, I. Mertens, and B. Vanderborght *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 79 p refs (For primary document see N86-17895 08-45)
(Contract SR-028-B)
(EUR-9385-EN) Avail: NTIS HC A18/MF A01

N86-17898# Electricite de France, Chatou.
NUMERICAL TECHNIQUES AND DISPERSION MODELING
J. Y. Caneill and A. E. Saab *In* Von Karman Inst. for Fluid Dynamics. Pollutant Dispersal 1985 21 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17900# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
FLUCTUATING WIND EFFECTS
S. Brown *In its* Pollutant Dispersal 1985 47 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17901# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
LAGRANGIAN MODELING OF TURBULENT DISPERSION
C. Benocci and D. Olivari *In its* Pollutant Dispersal 1985 41 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17904# San Jose State Univ., Calif. Dept. of Meteorology.
APPLICATION OF LINKED THREE-DIMENSIONAL PLANETARY BOUNDARY LAYER (PBL) AND DISPERSION MODELS TO NEW YORK CITY
R. Bornstein, U. Pechinger (Zentralanstalt fuer Meteorologie und Geodynamik, Vienna, Austria), R. Street (Stanford Univ., Calif.), F. Ludwig (SRI International, Menlo Park, Calif.), S. Klotz (Stanford Univ., Calif), R. Salvador, L. J. Shien (IBM, Palo Alto, Calif.), and R. Miller *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 22 p refs Presented at 15th NATO/CCMS Conference, St. Louis, Mo., 16-20 Apr. 1985 (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-17969# Naval Postgraduate School, Monterey, Calif.
ESTIMATION OF SEA-SURFACE WINDSPEED FROM WHITECAP COVER: STATISTICAL APPROACHES COMPARED EMPIRICALLY AND BY SIMULATION
I. G. OMuircheartaigh and D. P. Gaver Sep. 1985 59 p
(AD-A159816; NPS55-85-021) Avail: NTIS HC A04/MF A01 CSCL 04/2

In this work, several (5) statistical estimators for solving the typical remote sensing inverse problem are explained, illustrated and evaluated using both real data sets connecting surface windspeed and whitecap coverage and simulated data. The results suggests the superiority of some of these estimators. GRA

N86-17970# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
BIBLIOGRAPHY OF RESEARCH ON OCEAN FRONTS, 1964-1984 Final Report
L. B. Gilham, J. J. Mika, and D. A. Wiesenburg Aug. 1985 58 p
(AD-A160040; NORDA-TN-303) Avail: NTIS HC A04/MF A01 CSCL 08/10

This report contains a bibliography of published papers describing research related to oceanic fronts. The citations cover research on physical, chemical and biological oceanographic studies of ocean fronts and also observations made by remote sensing. The papers listed cover the period from 1964 to 1984. A few earlier papers, considered classics, are also included. This bibliography was assembled as the first step in a program to study the dynamic chemical processes associated with ocean frontal boundaries. Over 750 citations are included. GRA

N86-17971# World Meteorological Organization, Geneva (Switzerland).
INTERNATIONAL LIST OF SELECTED, SUPPLEMENTARY AND AUXILIARY SHIPS
1985 403 p In ENGLISH and FRENCH
(WMO-47-ED-85) Avail: NTIS MF A01; hard copy available at WMO, Geneva, SWFR 37

The names, country of origin, instruments, operating conditions, number of radio operators, and call signs of ships in the World Meteorological Organization Observing Ship Scheme are listed. The method of obtaining sea surface temperature is indicated. Author (ESA)

N86-17972# European Space Agency, Paris (France). PIPOR Science Working Group.
A PROGRAM FOR INTERNATIONAL POLAR OCEANS RESEARCH (PIPOR) Final Report
B. Battrick, ed. and Erica Rolfe, ed. Sep. 1985 47 p refs Original contains color illustrations
(ESA-SP-1074) Avail: NTIS HC A03/MF A01

The importance of polar regions in atmospheric and oceanic circulation is outlined, and a polar regions research program is proposed. Real-time, high resolution satellite data on ice distribution and characteristics are essential to a variety of application areas. Synthetic aperture radar data must be acquired over the entire polar region in a quantity sufficient to monitor significant geophysical processes. For optimal all-weather monitoring of the polar regions, satellite SAR data must be coupled with passive microwave data

and augmented by measurements from in-situ, autonomous data-collection systems. Satellite observations must be validated through comparisons with measurements made by surface parties, airborne remote sensing, and submarines. Ocean buoy technology should be developed to provide expanded atmospheric and oceanic observations. High-quality hydrographic and geochemical measurements in the polar oceans will contribute significantly to understanding of ocean circulation. Modeling research in air - sea - ice interaction should be expanded. Author (ESA)

N86-17973# National Oceanic and Atmospheric Administration, Boulder, Colo. World Data Center A for Solid Earth Geophysics.
TSUNAMIS IN PERU-CHILE
Jul. 1985 107 p
(PB85-247815; SE-39) Avail: NTIS HC A06/MF A01 CSCL 08C

Maps that show major geologic features of the entire region and locations of major coastal cities in Peru-Chile are presented. Each region includes five tables that contain the following information: (1) list of earthquakes that both occurred and generated tsunamis in the region; (2) effects in Peru-Chile of tsunamis generated in the region; (3) effects outside Peru-Chile of tsunamis generated in the region; (4) damage and number of deaths from tsunamis in the region; (5) coastal cities in the region that reported tsunamis from all sources. The chapters describing the above regions contain: bar graphs depicting the number of tsunamigenic earthquakes that occurred at each degree of latitude; maps showing the extent of affected coastline for several of the larger earthquakes; and maps showing areas throughout the Pacific Ocean Basin where major tsunamis were reported. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-17974 Admiralty Marine Technology Establishment, Portsmouth (England). Dockyard Lab.
THE EVALUATION OF COPPER COMPOUNDS AS POTENTIAL FUEL BIOCIDES
J. T. Gisborne, P. Robinson, and M. Shearman May 1984 8 p refs
(AMTE(M)-84520; BR94710) Avail: NTIS HC A02/MF A01

Copper oxide, acetate, nitrate, and sulfate compounds, envisaged as antifungal agents for fuel tank coatings, were tested for biocidal activity using bridged slide and test tube methods. High dose levels are required of each compound before the germination of the fungus Cladosporium resinae is inhibited.
Author (ESA)

N86-17975# Naval Air Systems Command, Washington, D. C.
INVERSE FARADAY EFFECT IN HEMOGLOBIN DETECTED BY RAMAN SPECTROSCOPY: AN EXAMPLE OF MAGNETIC RESONANCE RAMAN ACTIVITY Final Report
T. W. Barrett 3 Jun. 1985 35 p
(AD-A159806; NADC-85074-60) Avail: NTIS HC A03/MF A01 CSCL 06/1

A complete polarization study of human oxy and carbonmonoxy-hemoglobin A and S is reported for backscattered light in the resonance Raman light scattering situation with excitations in the long wavelength region, wavelength = 4579 A and 5815 A, and excitation in the short wavelength region, wavelength = 4579 A and 4880 A, as comparison. All four polarization components of the scattered light with respect to the two polarization conditions of linearly and circularly polarization of the incident light were measured. These were: (1) parallel; (2) perpendicular; (3) corotating; and (4) contrarotating. GRA

N86-17976# Minnesota Univ., Minneapolis. Immunobiology Research Center.
HLA-D: THE T CELL PERSPECTIVE
F. H. Bach, N. Ohta, A. Anichini, and N. L. Reinsmoen 1985 32 p
(Contracts N00014-85-K-0004; PHS-AI-17687)
(AD-A160019) Avail: NTIS HC A03/MF A01 CSCL 06/16

The introduction of the mixed leukocyte culture test (MLC) combined with the establishment of a one-way method of stimulation in MLC allowed the correlation of proliferative response in MLC with results of serological studies and the suggestion that reactivity in MLC is controlled by the major histocompatibility complex in man, now known as HLA. That the chromosomal region of HLA which controls the strongest stimulatory determinants for MLC (now known as the HLA-D region) was different from the class I encoding genes was already suggested in two early studies. Definitive evidence in this regard came from the studies of Yunis and Amos (1971). It is our purpose in this paper to discuss our current knowledge of the HLA-D region from the T cell perspective, an area that has been recently reviewed. The use of techniques that allow definition of determinants recognized by T lymphocytes and associated with HLA class II molecules has, thus, allowed definition of further polymorphisms not recognized with currently available/characterized serological reagents. Given the intimate relationship thought to exist between T lymphocyte recognition and major histocompatibility complex encoded molecules, definition of this LD (T lymphocyte defined), polymorphism may be of the greatest import. GRA

N86-17977# Minnesota Univ., Minneapolis.
CLONAL ANALYSIS OF HLA-DR AND -dQ ASSOCIATED DETERMINANTS: THEIR CONTRIBUTION TO dw SPECIFICITIES
N. L. Reinsmoen and F. H. Bach 1985 39 p
(Contract N00014-85-K-0004)
(AD-A160059) Avail: NTIS HC A03/MF A01 CSCL 06/16

In order to investigate the distribution of epitopes recognized by T cell clones directed against HLA class II products, bulk primed cell populations were generated using cells matched for class I determinants but disparate for class II determinants. Cells were cloned by single cell deposition (FACS IV) or limiting dilution (1 cell/3 wells), and assayed for proliferative and cytolytic function with panels of well-characterized cells. Our data indicate that determinants detected on both DR and DQ products are associated with the Dw type of the sensitizing cell showing that there is polymorphism recognized by T cells on both DR and DQ that is subtypic to the serologically defined specificities. Thus, it appears that the bulk T cell response is a composite of individual clones recognizing distinct determinants on these class II molecules. The implications of these findings for studies of HLA restricted recognition are discussed. GRA

N86-17978# Department of Energy, Washington, D. C.
METHOD FOR IMPROVING PRODUCT YIELDS IN AN ANIONIC METALLOPORPHYRIN-BASED ARTIFICIAL PHOTOSYNTHESIS SYSTEM Patent Application
J. A. Shelnutt, inventor (to DOE) Filed 29 Nov. 1984 27 p
(Contract DE-AC04-76DP-00789)
(DE85-017723; US-Patent-Appl-SN-676046) Avail: NTIS HC A03/MF A01

A method is disclosed improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system for hydrogen generation. The method comprises forming an aqueous solution comprising an electron donor, methylviologen, and certain metalloporphyrins and metallochlorins, and irradiating said aqueous solution with light in the presence of a catalyst. In the photosynthesis process, solar energy is collected and stored in the form of a hydrogen. Ligands attached above and below the metalloporphyrin and metallochlorin plane are capable of sterically blocking photochemically inactive electrostatically bound (PI)-(PI) complexes which can develop. DOE

N86-17979# Argonne National Lab., Ill.
PROTEIN MAPPING AND THE PROBLEM OF COMPLEXITY IN MOLECULAR BIOLOGY
L. Anderson and N. Anderson 1985 7 p Presented at the Electrophorese Forum, Munich, West Germany, 21 Oct. 1985
(Contract W-31-109-eng-38)
(DE85-018349; CONF-8510157-1) Avail: NTIS HC A02/MF A01

Two-dimensional electrophoretic protein mapping is now ten years old. Although it was evident to many in 1975 that a system for separating thousands of proteins would have a great effect on biology, the true parameters of this revolution are only now becoming apparent. This paper discusses what has been affected by the development of protein mapping, what the possibilities are now, why it has taken a decade to get this far. DOE

N86-17980# Medical Biological Lab. RVO-TNO, The Hague (Netherlands).
REPORT OF THE SYMPOSIUM ON BIOLOGICAL MONITORING OF EXPOSURE TO METALS AND OTHER INORGANIC COMPOUNDS [VERSLAG VAN HET SYMPOSIUM: BIOLOGICAL MONITORING OF EXPOSURE TO METALS AND OTHER INORGANIC COMPOUNDS]
P. C. Bragt 1985 12 p In DUTCH Symposium held in Miami, Fla., 30 Apr. - 2 May 1985
(MBL-1985-6; TDCK-93252) Avail: NTIS HC A02/MF A01

Metal concentration measurements in blood and urine, methods used, and social aspects within industrial sanitation, are discussed. Concentration measurements were done on Al, As, Cd, Cr, Hg, Ni, and Pb. Analysis methods such as inductively coupled plasma atomic emission spectrophotometry (ICP-AEA), and ICP electrothermal vaporization combination, ICP with cross flow nebulizer, inductively coupled argon plasma optical emission spectroscopy and Zeeman effect graphite furnace, were considered. Concerning an eventual legal status of biological monitoring, aspects of quality control were emphasized. Author (ESA)

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-17981# Medical Coll. of Ohio, Toledo. Dept. of Pathology.
BIOASSAY OF MILITARY RELEVANT COMPOUNDS FOR CARCINOGENIC ACTIVITY BY THE STRAIN A MOUSE LUNG TUMOR BIOASSAY Final Phase Report, Mar. 1983 - May 1984
G. D. Stoner Jan. 1985 17 p
(Contract DAMD17-81-C-1178; DA Proj. 3M1-61102-BS-10)
(AD-A156772) Avail: NTIS HC A02/MF A01 CSCL 06/5

Two dye compounds, C.I. Solvent Yellow 33 and a mixture of C.I. Solvent Green 3-C.I. Solvent Yellow 33, utilized in colored smoke grenades, were tested for carcinogenic potential in the strain A mouse lung tumor bioassay. The maximum tolerated dose for each dye was determined to be 25 mg/kg. At total doses of 600, 300 and 120 mg/kg, C.I. Solvent Yellow 33 and a mixture of C.I. Solvent Green 3-C.I. Solvent Yellow 33 did not produce an increase in the lung tumor response (i.e., the percentage of mice with lung tumors per mouse) when compared to vehicle (tricaprylin) controls. Therefore, at the dose levels administered both dyes are non-carcinogenic in the strain A mouse lung tumor bioassay under the conditions of the test. At necropsy, mice tested with either compound have significant quantities of accumulated dye in their tissues. This observation suggests that the dyes are either not metabolized or only partially metabolized by the animals.
Author

N86-17982# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
A COMPARISON OF POSTMORTEM CORONARY ATHEROSCLEROSIS FINDINGS IN GENERAL AVIATION PILOT FATALITIES
C. F. Booze, Jr. and C. M. Staggs Aug. 1985 12 p
(AD-A159811; DOT/FAA-AM-85-6) Avail: NTIS HC A02/MF A01 CSCL 06/5

Autopsy reports of 710 pilots involved in fatal general aviation accidents and received by the FAA for the years 1980 to 1982 were reviewed to appraise the age-specific prevalence of coronary atherosclerosis among the autopsied group and compare findings with those of an earlier study of a similar pilot group. Sixty-nine percent of the autopsies on pilots killed in aircraft accidents indicated some degree of coronary atherosclerosis ranging from minimal to severe. This finding is higher than for a similar group of pilots studied during the years 1975 to 1977. However, only about 2.5% of the 1980 to 1982 study group were found to have severe coronary atherosclerosis, compared with 5% in the previous study. Prevalence of severe coronary atherosclerosis increased with age from 5.8 per 1,000 for ages less than 40 years to 73.9 for ages 50 years and above, also reflecting lower age-specific rates for severe coronary atherosclerosis than were found in the previous study. Recent emphasis on autopsy format and attention to sudden incapacitation is felt to have resulted in more accurate reporting for recent years. Prevalence of severe coronary atherosclerosis among the recently studied pilot group was less than that observed in an earlier study of a similar group.
GRA

N86-17983# Harvard Univ., Boston, Mass. School of Public Health.
EXPEDIENT METHODS OF RESPIRATORY PROTECTION. 3: SUBMICRON PARTICLE TESTS AND SUMMARY OF QUALITY FACTORS
John M. Price, Douglas W. Cooper, and Charles S. Yee Jul. 1985 86 p refs
(TI85-018278; NUREG/CR-3537; NRC-A-1042; SAND-83-7450)
Avail: NTIS HC A05/MF A01

The efficacy of readily available materials, such as cotton fabrics, toweling, a surgical mask, and a single-use respirator, for providing emergency respiratory protection was evaluated by determining the filtration efficiency as a function of aerosol particle size over the size range of 0.001 to 5.0 micron and as a function of filtration face velocity. Filtration face velocity was set at 1.5, 5.0, and 15.0 sq cm. The equipment and procedures used to obtain efficiency measurements for particles 0.5 micron in diameter and smaller are described. Particles with diameters from 0.10 to 0.50 micron proved to be the most difficult sizes of particles to remove. Particles smaller than 0.10 micron were removed due to diffusion while particles larger than 0.50 micron were removed due to inertia and gravitational settling. Deposition of the smallest particles was favored by the use of low face velocities. A fractional efficiency curve was determined for each material at each velocity for comparison. Values of the quality factor were calculated. Quality factors were less for wet materials than for dry; less at high velocities rather than low; and best for the single-use respirator mask, next best for the surgical mask and often third best for the toweling.
E.A.K.

N86-17984# Harvard School of Public Health, Boston, Mass.
ASSESSMENT OF INDIVIDUAL HUMAN EXPOSURES TO OZONE IN A HEALTH STUDY
D. T. Mage, M. Raizenne, and J. Spengler Aug. 1985 17 p refs
(PB85-245975; EPA-600/D-85-195) Avail: NTIS HC A02/MF A01 CSCL 06T

The minute dose of ozone delivered to the lower respiratory tract of a subject depends upon the ozone concentration inhaled, the minute volume (Ve 1/min) and the fraction of the inhaled ozone that penetrates the nasopharyngeal passages to enter the trachea. The ozone concentration (X) depends on the time of day and whether the subject is indoors or outdoors. The minute volume depends on the subject's age, sex, weight, and physical activity level. The fractional deposition of ozone depends on the concentration inhaled (X), the minute volume (Ve), and the mode of breathing (nasal or oronasal). These dependencies are reviewed and a calculation of a daily ozone dosage is presented for a prototypical 12-year old child at summer camp who varies his physical activities in indoor and outdoor settings over a 24-hour period.
Author (GRA)

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-17985# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany). Buero der Nachrichten fuer Luftfahrer.
INSTRUCTIONS FOR FLIGHT CREW MEMBERS AND FLIGHT CREW TRAINING AND EXAMINATION GUIDELINES OF THE WEST GERMAN FEDERAL BOARD OF TRANSPORT [VERORDNUNG UEBER LUFTFAHRTPERSONAL (LUFTPERSV) UND RICHTLINIEN DES BUNDESMINISTERS FUER VERKEHR FUER DIE AUSBILDUNG UND PRUEFUNG DES LUFTFAHRTPERSONALS]
Apr. 1984 124 p In GERMAN
(Rept-1) Avail: NTIS HC A06/MF A01

Regulations for obtaining flight authorization and for flight legitimacy for private aircraft pilots, for air navigators, and airline crew members, as well as certifications for onboard instruments and long distance flights were determined. The guidelines of the West German Federal Board of Transport for crew members' theoretical and practical training, and examinations in mathematics, physics, chemistry, and English were drawn up. Examples of the tests are given. Author (ESA)

N86-17986# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Vision Research Group.
PHOTOSIMULATION OF TARGET ACQUISITION IN THE PRESENCE OF SMOKE: A PILOT STUDY
J. M. Valeton and J. J. Vos Nov. 1984 19 p refs
(Contract A79/KL/151)
(IZF-1984-36; TDCK-79980) Avail: NTIS HC A02/MF A01

A quality measure derived from smoke screen hole statistics was related to the probability of target detection. A background scene (hilly landscape), a target (tank silhouette in 1 of 20 possible locations) and a smoke screen (strong homogeneous veil of light) were projected onto a screen. Observers searched the scene with a rotatable telescope (magnification x 1) and fired when a target was found. The smoke projector was switched on and off to produce sequences of holes and obscurations corresponding to a prescribed smoke screen quality. Results show that smoke quality is a good predictor of target screening; targets are found only when the sight passes over them; even relatively conspicuous targets do not attract enough attention to disrupt the regular search pattern; and search speed is strongly determined by target conspicuousness. Author (ESA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-17987 Admiralty Marine Technology Establishment, Portsmouth (England). Experimental Diving Unit.
PERFORMANCE COMPARISON OF THIRTY, TWO-STAGE DEMAND REGULATORS
I. A. Himmens Jan. 1984 25 p refs
(ARE(M6)-TM-83818; BR94139) Avail: NTIS HC A02/MF A01

Thirty, two-stage air demand regulators were tested. Only 2 meet the recommended limits for breathing resistance and work of breathing for the 3 ventilation rates at the maximum depth of 50 msw. A majority of the regulators exhibit rapid degradation of inhalation response at a ventilation rate of 62.5 l/min, beyond their respective maximum depths or as cylinder pressures approach 30 Bar. Author (ESA)

N86-17988 Royal Air Force Inst. of Pathology and Tropical Medicine, Aylesbury (England). Aircraft Equipment Group.
A WATERPROOF VENT VALVE FOR IMMERSION SUITS
G. Richardson Dec. 1984 20 p refs
(Rept-515; BR95132) Avail: NTIS HC A02/MF A01

An air vent valve for flight crew immersion suits was developed. Experiments show that the valve, closed by hydrostatic pressure, vents an immersion coverall undergoing rapid changes in altitude. Such a valve allows no water to enter the coverall during immersion in water with moderate wave motion or doing normal dinghy entry drills. Exploitation of the technique significantly improves comfort to users of air immersion coveralls at altitude. It prevents loss of insulation through collapse on descent. The advantages can be maintained without the risk of allowing water to enter the coverall. Extension of the principle to allow microclimatic ventilation by bellows action is suggested. Author (ESA)

N86-17989# Oak Ridge National Lab., Tenn.
ADVANCED SERVOMANIPULATOR DEVELOPMENT
D. P. Kuban 1985 41 p Presented at the France/US Department of Energy Meeting on Remote Systems Technology, Saclay, France, 2 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017720; CONF-8509156-2) Avail: NTIS HC A03/MF A01

The Advanced Servomanipulator (ASM) System consists of three major components: the ASM slave, the dual arm master controller (DAMC) or master, and the control system. The ASM is remotely maintainable force-reflecting servomanipulator developed at the Oak Ridge National Laboratory (ORNL) as part of the Consolidated Fuel Reprocessing Program. This new manipulator addresses requirements of advanced nuclear fuel reprocessing with emphasis on force reflection, remote maintainability, reliability, radiation tolerance, and corrosion resistance. The advanced servomanipulator is uniquely subdivided into remotely replaceable modules which will permit in situ manipulator repair by spare module replacement. Manipulator modularization and increased reliability are accomplished through a force transmission system that uses gears and torque tubes. Digital control algorithms and mechanical precision are used to offset the increased backlash, friction, and inertia resulting from the gear drives. This results in the first remotely maintainable force-reflecting servomanipulator in the world. DOE

N86-17990# Clarke Ambrose, Inc., Knoxville, Tenn.
HUMAN-MACHINE INTERFACES FOR TELEOPERATORS: AN OVERVIEW OF RESEARCH AND DEVELOPMENT AT THE OAK RIDGE NATIONAL LABORATORY. CONSOLIDATED FUEL REPROCESSING PROGRAM
J. V. Draper and M. J. Feldman 1985 23 p Presented at the France/U.S. Department of Energy Meeting on Remote Systems Technology, Saclay, France, 2 Sep. 1985 Prepared in cooperation with ORNL, Tenn.
(Contract DE-AC05-84OR-21400)
(DE85-017713; CONF-8509156-1) Avail: NTIS HC A02/MF A01

This paper surveys the contributions of human factors to the mission of the Remote Control Engineering (RCE) task over the last 6 years. These contributions can be divided into two areas, research efforts and design efforts. Some of the topics covered in human factors research are manipulator comparisons, investigation of viewing system characteristics, research into the effects of force reflection, and studies of crew size and task allocation. In the area of component design the human factors group was primarily responsible for the conceptual design of the Advanced Integrated Maintenance System (AIMS) control room, including all operator work stations and overall control room architecture. The human factors group also contributed to the design of the AIMS master controller handle. Recent research at the RCE task has centered on comparison of manipulator systems. This research was planned and conducted by the human factors group and other ORNL personnel. The research is aimed at evaluating three important characteristics of manipulator systems: system dynamics, force feedback, and human-machine interface. DOE

N86-17991# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

THE BIOMORPHIC MODEL OF THE HUMAN PILOT
O. H. Gerlach 1984 134 p refs
(VTH-LR-310) Avail: NTIS HC A07/MF A01

A mathematical model of the overt behavior of a human operator when controling an aircraft-like dynamic element in a closed loop situation is described. Since the aim is to achieve a close correspondence between the physiological and psychological processes going on in the human controller and their mathematical expression in the model, the latter is named the biomorphic model. The model refers only to single-display, single-axis control situations. A computer program selecting the free parameters in the model and calculating their characteristics is discussed.
Author (ESA)

N86-17992# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Thermofysiologie.
HEAT TRANSFER IN IMPERMEABLE CLOTHING: SWEAT PLAYS A ROLE AFTER ALL
F. J. G. vandeLinde, H. vanMiddendorp, and W. A. Lotens May 1985 19 p refs In DUTCH; ENGLISH summary
(Contract A81/K/041)
(IZF-1985-9; TDCK-93219) Avail: NTIS HC A02/MF A01

In a laboratory experiment with six subjects, the effective thermal insulation of a totally impermeable outfit was measured in two different conditions to prove that vapor transfer contributes to the total heat release of the subjects. In the first condition, condensation of evaporated sweat in the inside of the outer impermeable was made impossible, in the second condition such condensation was allowed. Processes of humid heat transfer inside the clothing cause a 40% decrease in effective insulation. Therefore, at ambient temperatures lower than skin temperature, heat stress is lower than expected on the basis of clothing insulation judged by thickness or determined in nonhumid situations.
Author (ESA)

N86-17993# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Technische Menskunde.
A COMPUTER AIDED DESIGN (CAD) SYSTEM AS A TOOL FOR THE ERGONOMIST IN DEVELOPING MAN-MACHINE SYSTEMS
P. I. L. Moonen Jun. 1985 37 p refs In DUTCH; ENGLISH summary
(IZF-1985-10; TDCK-93253) Avail: NTIS HC A03/MF A01

The use of a Computer Aided Design (CAD) system in an anthropometric computer model is discussed. For its presentation function, ease of operation, interpretation, etc. are required. However, for the test function, ergonomic knowledge expressed in standards is demanded. The possibilities and limitations of an existing CAD system are discussed. The profit of the system concerning the test function is doubted, for ergonomic knowledge is rarely expressed in standards. In case of the realization of a test function, a substantial investment is required, justified only by frequent and large-scale use.
Author (ESA)

N86-17994# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie.
COLOR ON DISPLAYS. PART 1: THE PSYCHOPHYSICAL AND PHYSIOLOGICAL ASPECTS
J. Walraven Jun. 1985 71 p refs In DUTCH; ENGLISH summary
(IZF-1985-11; TDCK-93254) Avail: NTIS HC A04/MF A01

Aspects of color, important for display designers and human factors engineers, who use color for structuring, coding and/or accentuation of display information, are presented. The dimensions of color (perceptual and stimulus); discriminating between the aperture and object mode, color metrics and its applicability for display colors, perceptual artefacts, and the diminished color discrimination for small visual angles (small-field tritanopia), color in relation to accomodation problems (chromatic aberration, resting focus), and the problem of the display user with defective color vision are considered.
Author (ESA)

N86-17995# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
PSYCHOLOGICAL PROBLEMS ASSOCIATED WITH THE WEARING OF RESPIRATORY PROTECTIVE DEVICES: A REVIEW
Eva Mauritzson-Sandberg and Lennart Sandberg Jun. 1985 37 p refs In SWEDISH; ENGLISH summary Sponsored by Swedish Civil Defence Administration
(FOA-C-40216-C2; ISSN-0347-2124) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

Psychological reactions to wearing breathing apparatus were studied. Discomfort is found to be associated with restricted speech transmission, restricted field of view, and increased inhalation and exhalation resistance. A relatively rapid adaptation to the wearing of respirators is noted. Sensory deprivation and motivation are discussed.
Author (ESA)

N86-17996# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
HELICOPTER COCKPIT ORGANIZATION FOR NIGHT VISION
M. A. Veve 1985 8 p Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-103) Avail: NTIS HC A02/MF A01

Ultraviolet lighting associated with a yellow-green fluorescent paint was selected as a cockpit night vision system compatible with the use of light intensification goggles, when performing military missions at night. The characteristics of night vision goggles are reviewed. Ergonomic and safety aspects are discussed. The system proposed optimizes the cockpit lighting with regard to physiological properties of the human eye. The spectral output of the lighting system is separated from the spectral response of the image intensifier photocathode.
Author (ESA)

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-17997*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PARTITIONING PROBLEMS IN PARALLEL, PIPELINED AND DISTRIBUTED COMPUTING Final Report
Shahid Bokhari Nov. 1985 34 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178023; ICASE-85-54; NAS 1.26:178023) Avail: NTIS HC A03/MF A01 CSCL 12A

The problem of optimally assigning the modules of a parallel program over the processors of a multiple computer system is addressed. A Sum-Bottleneck path algorithm is developed that permits the efficient solution of many variants of this problem under some constraints on the structure of the partitions. In particular, the following problems are solved optimally for a single-host, multiple satellite system: partitioning multiple chain structured parallel programs, multiple arbitrarily structured serial programs and single tree structured parallel programs. In addition, the problems of partitioning chain structured parallel programs across chain connected systems and across shared memory (or shared bus) systems are also solved under certain constraints. All solutions for parallel programs are equally applicable to pipelined programs. These results extend prior research in this area by explicitly taking concurrency into account and permit the efficient

utilization of multiple computer architectures for a wide range of problems of practical interest. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-17998*# Virginia Univ., Charlottesville. Dept. of Applied Mathematics.
RESEARCH IN COMPUTER SCIENCE Semiannual Report
James M. Ortega Jan. 1986 8 p
(Grant NAG1-242)
(NASA-CR-176486; NAS 1.26:176486; UVA/528209/AM86/108) Avail: NTIS HC A02/MF A01 CSCL 09B

Various graduate research activities in the field of computer science are reported. Among the topics discussed are: (1) failure probabilities in multi-version software; (2) Gaussian Elimination on parallel computers; (3) three dimensional Poisson solvers on parallel/vector computers; (4) automated task decomposition for multiple robot arms; (5) multi-color incomplete cholesky conjugate gradient methods on the Cyber 205; and (6) parallel implementation of iterative methods for solving linear equations. G.L.C.

N86-17999# Naval Ocean Systems Center, San Diego, Calif.
NOSC UNIBUS (TRADEMARK) UNIVAC INPUT/OUTPUT CONTROLLER
R. Mitchell Aug. 1985 50 p
(AD-A159802; NOSC/TD-822) Avail: NTIS HC A03/MF A01 CSCL 09/2

The NOSC-developed UNIBUS/UNIVAC compatible input/output Controller (IOC) is designed to provide any host computer supporting the Digital Equipment Corp. The UNIBUS configuration with an input/output (I/O) channel whose protocol, timing, and electrical interface specifications are compatible with standard NTDS FAST and Univac 1100 series I/O channels. In addition, true differential I/O operation is provided for use in systems where this is supported or where intercomputer grounding problems exist. The IOC can operate when connected to either a peripheral I/O device such as a line printer or a card reader (normal mode), or the I/O channel of another computer (intercomputer mode). The mode is software selectable. By using IOCs in multiple hosts, parallel intercomputer channels may be readily established between them. Unless specifically noted otherwise, the device connected to; the IOC will be referred to as the I/O subsystem regardless of the mode being used. The computer housing the IOC will be referred to as the host. GRA

N86-18000# Naval Postgraduate School, Monterey, Calif.
A GRAPH THEORETIC ALGORITHM FOR CONTOUR SURFACE DISPLAY GENERATION M.S. Thesis
M. Sahintepe Jun. 1985 154 p
(AD-A159822) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis develops a graph theoretic algorithm for contour surface display generation. The inadequacies of the currently published algorithms, with respect to contour line generation for a subgrid, are pointed out in a brief review of the available literature. The algorithm developed in this study, called the Large Contouring Tree Algorithm, gets rid of the cited inadequacies. The core component of the introduced algorithm is a two-dimensional contouring algorithm that operates on two-dimensional slices of a larger three-dimensional grid. The Large Contouring Tree Algorithm in the PASCAL programming language is presented in Appendix A. Author (GRA)

N86-18001# Allied Bendix Corp., Kansas City, Mo.
CAD-CAM DATABASE MANAGEMENT AT BENDIX KANSAS CITY
D. R. Witte May 1985 30 p Presented at the CAD/CAM Databases: Who's in Control?, San Francisco, Calif., 29-30 Apr. 1985
(Contract DE-AC04-76DP-00613)
(DE85-017579; BDX-613-3282; CONF-8504177-1) Avail: NTIS HC A03/MF A01

The Bendix Kansas City Division of Allied Corporation began integrating mechanical CAD-CAM capabilities into its operations in June 1980. The primary capabilities include a wireframe modeling application, a solid modeling application, and the Bendix Integrated Computer Aided Manufacturing (BICAM) System application, a set of software programs and procedures which provides user-friendly access to graphic applications and data, and user-friendly sharing of data between applications and users. The BICAM also provides for enforcement of corporate/enterprise policies. Three access categories, private, local, and global, are realized through the implementation of data management metaphors: the desk, reading rack, file cabinet, and library are for the storage, retrieval, and sharing of drawings and models. Access is provided through menu selections; searching for designs is done by a paging method or a search-by-attribute-value method. The sharing of designs between all users of Part Data is key. The BICAM System supports 375 unique users per quarter and manages over 7500 drawings and models. The BICAM System demonstrates the need for generalized models, a high-level system framework, prototyping, information-modeling methods, and an understanding of the entire enterprise. Future BICAM System implementations are planned to take advantage of this knowledge. DOE

N86-18002# Oak Ridge National Lab., Tenn.
PARALLEL CHOLESKY FACTORIZATION ON A HYPERCUBE MULTIPROCESSOR
G. A. Geist and M. T. Heath Aug. 1985 53 p
(Contract DE-AC05-84OR-21400)
(DE85-018121; ORNL-6190) Avail: NTIS HC A04/MF A01

Two types of message-passing parallel algorithms are developed for solving symmetric systems of linear equations on a hypercube multiprocessor. One type involves broadcast communication among processors, and the other involves communication along a ring of processors. Details are provided in the form of C-programs that implement the algorithms on a hypercube simulator and which should run with little modification on real hypercube hardware. Performance of the various algorithms is demonstrated by means of processor utilization graphs and parallel speedup curves. DOE

N86-18003# World Meteorological Organization, Geneva (Switzerland).
GUIDE TO THE AUTOMATION OF DATA-PROCESSING CENTERS
1985 110 p
(WMO-636; ISBN-92-63-10636-3) Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 20

The requirements for automation of data processing centers by meteorological services are specified. Project planning; computer system design; software development; contracts; computer installation; acceptance tests; staff selection and training; operation and maintenance of hardware and software; upgrading an already automated center; and data processing system configurations are covered. Author (ESA)

N86-18004# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
TECHNICAL OVERVIEW OF THE INFORMATION RESOURCE DICTIONARY SYSTEM
A. Goldfine and P. Konig Apr. 1985 135 p
(PB85-224491; NBSIR-85/3164) Avail: NTIS HC A07/MF A01 CSCL 09B

A technical overview of the computer software specifications for the information Resource Dictionary System (RDS) is presented. It summarizes the data architecture and the software functions and processes of the IRDS. The IRDS Specifications are a draft proposed American National Standard, a draft proposed U.S. Federal Information Processing Standard, and a Working Docu-

ment of the International Organization for Standardization (ISO), Subcommittee 21, Working Group 3. The overview also provides background information on the development of the draft proposed U.S. standards. GRA

N86-18005# Brighton Polytechnic (England). Dept. of Computing and Cybernetics.
NOVEL COMPUTER ARCHITECTURES FOR DATA STORAGE AND RETRIEVAL
F. N. Teskey 1985 49 p refs
(BLRDR-5845) Copyright. Avail: Issuing Activity

The aim of this report is to review selected novel computer architectures for data storage and retrieval and assess their implication for library and information work. The report is based on an examination of published literature and consultations with research workers, manufacturers and users of these machines in the U.K. The report outlines the particular data storage and retrieval requirements for library and information work, and discusses some of the novel systems that are currently being used in this field. A number of new architectures with possible application in this field are now being developed by research teams in the U.K. and the report contains descriptions of these projects. The report summarizes the possible applications of both the existing and proposed systems to library and information work, and suggests areas for future research and development. DOE

N86-17267# National Aerospace Lab., Tokyo (Japan).
IMAGE PROCESSOR ARCHITECTURES AND A DATA-DRIVEN IMAGE PROCESSORE: TIP-1
Tsutomu Temma *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 175-182 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-18006 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
A NEW APPROACH TO THE DESIGN AND CONSTRUCTION OF PROTOCOL TESTERS
J. R. Pavel Mar. 1985 41 p refs
(NPL-DITC-54/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

A design for a distributed open system interconnection testing system and a methodology for building it are presented. The hierarchical design gives test definers better control of the point closest to the system under test. It can express the test at the octet level, or at the protocol phase level. The hierarchical design is suited to a bottom-up development methodology, allowing postponement of binding design commitments to the last possible stage. Being able to reassemble the building blocks of a test driver in different ways increases its flexibility and adaptability. The ability to produce prototypes of protocol data unit decoders using Prolog grammar clauses and so to produce protocol data unit decoders automatically by a parser generator based on attribute grammars should reduce the cost of producing testing systems significantly. A user interface to the hierarchical testing system for use as a development aid to protocol implementors is presented.
Author (ESA)

N86-18007 CIAD, Zoetermeer (Netherlands).
TEST OF APPLICON BRAVO [TEST APPLICON BRAVO]
J. J. Duivenvoorden and C. Tjallema 1984 30 p In DUTCH
(A-13; ISBN-90-6818-017-7) Copyright. Avail: Issuing Activity

An Applicon Bravo computer aided design (CAD) configuration, containing a VAX-11/751 computer, CDC diskdrive, tape unit, 4650 wokstation, Calcomp plotter, and Tektronix Hardcopy-unit, was tested. The system is suited for mechanical and electrical purposes. After base-figure construction, two-dimensional design manipulations, transformations, reflections, rotations, reductions, and rescalings, were executed. Line-strings, edgings, parameterized forms, accuracy, draw-speed, data storage efficiency, and coupling possibilities with FORTRAN programs were investigated. An engine, a T-piece with flanges, and a ship's plating were modeled in three dimensions and combined. Two and three-dimensional integration was examined. For numerical control, pump-cylinder elaborations, were executed. Communication possibilities with other CAD-systems were examined. Positive points are: many functions; parts revisions are automatically transferred to compositions; screen; function response; powerful CPU's; well-established company. Negative points are: price; few line-types and shading possibilities; data storage efficiency; numerical control not optimal, lack of ship's plating thickness; the surface does not cover all coordinates.
Author (ESA)

N86-18008# Royal Signals and Radar Establishment, Malvern (England).
SSMS: A SECURE SOFTWARE MANAGEMENT SYSTEM
G. D. Whitaker Nov. 1984 13 p ref
(AD-A159489; RSRE-MEMO-3777; BR96554) Avail: NTIS HC A02/MF A01

A system for managing computer software, documentation, etc., based on a central data base, a diary of system updates, and utility programs is described. Two data files are stored in a secure system username. One file, sysdiary, is a character file with an entry for every change to system software. The second, sysindex, is a binary (random access) file with an entry for each item of system software, system documentation, data files etc. It is only possible to append information to the end of sysdiary and this is only permitted from certain secure usernames. Thus, sysdiary provides a secure and complete record of system changes as and when they occur and, because it is updated automatically, there is no opportunity for forgetfulness. Only one utility can write to sysindex, and it may be run only from the same secure usernames. The username which owns sysindex and sysdiary is used to store copies of the source text of all system software.
Author (ESA)

N86-18009# Naval Postgraduate School, Monterey, Calif.
REUSABLE SOFTWARE: TRADE-OFF ANALYSIS AND A NEW APPROACH M.S. Thesis
C. A. Murnan Jun. 1985 64 p
(AD-A159813) Avail: NTIS HC A04/MF A01 CSCL 09/2

Software reusability is seen as a resource which can assist in resolving the current software crisis. This thesis discusses issues that are relevant to the concept of reusable software. It reviews the definition of reusable software and presents software development scenarios to describe possible guidelines for performing a trade-off analysis in determining the pros and cons of incorporating reusable software concepts into a software product. The thesis also suggests the need for new and dramatically different methodologies to make software reusability a viable concept.
Author (GRA)

N86-18010# RAND Corp., Santa Monica, Calif.
THE RAND-ABEL PROGRAMMING LANGUAGE: HISTORY, RATIONALE, AND DESIGN Interim Report
N. Shapiro, H. E. Hall, R. Anderson, and M. LaCasse Aug. 1985 54 p
(Contract MDA903-85-C-0030)
(AD-A159821; RAND/R-3274-NA) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report describes the motivations behind the development of the RAND-ABLE programming language and some of its novel features. RAND-ABEL was designed to meet the needs of the Rand Strategy Assessment Center, which is building a large system for automated war gaming in which separate rule-based models represent U.S., Soviet, and third-country behavior. To satisfy the requirements for speed and transparency, the language

was designed to be: (1) rapidly compilable and executable; (2) self-documenting; (3) understandable by nonprogrammer domain experts after modest instruction; (4) reasonably easy to learn and use, especially for modifying or incrementally extending existing code; (5) portable across different computers; and (6) well suited to development of large and complex rule-based simulations. Certain of its features are unique: the ability to express directly in RAND-ABEL source code such natural structures as decision tables (isomorphic with decision trees) and order tables, which lay out orders to be executed sequentially, and its novel declaration-by-example feature, which is useful for rule-based programs with enumerated variables and many distinct data types. RAND-ABEL has built-in support for a data dictionary for communication between separate modules. Author (GRA)

N86-18011# Naval Postgraduate School, Monterey, Calif.
A SYSTOLIC ARRAY IMPLEMENTATION OF A REED-SOLOMON ENCODER AND DECODER M.S. Thesis
S. S. McKenzie Jun. 1985 93 p
(AD-A159824) Avail: NTIS HC A05/MF A01 CSCL 09/2

A systolic array is a natural architecture for the implementation of a Reed-Solomon (RS) encoder and decoder. It possesses many of the properties desired for a special-purpose application: simple and regular design, concurrency, modular expansibility, fast response time, cost-effectiveness, and high reliability. As a result, it is very will suited for the simple and regular design essential for VLSI implementation. This thesis takes a modular approach to the design of a systolic array based RS encoder and decoder. Initially, the concept of systolic arrays is discussed followed by an introduction to finite field theory and Reed-Solomon error correction codes. Then it is shown how RS codes can be encoded and decoded with primitive shift registers and implemented using a systolic architecture. In this way, the reader can gain valuable insight and comprehension into how these entities are coalesced together to produced the overall implementation. Author (GRA)

N86-18012# Naval Postgraduate School, Monterey, Calif.
PROBABILISTIC ANALYSIS OF FAULT TREES USING PIVOTAL DECOMPOSITION M.S. Thesis
W. T. McCullers, III Jun. 1985 69 p
(AD-A159856) Avail: NTIS HC A04/MF A01 CSCL 12/1

In this thesis an algorithm is presented for computing the exact failure probability for binary systems represented as fault trees. This algorithm does not rely on cut sets. Instead, it applies recursive pivotal decomposition together with probabilistic structural reductions and modularization directly to the fault tree. A further capability of the algorithm is the sequential printing of equations to form a function for a specific fault tree which computes system failure probability given the basic event probabilities. Author (GRA)

N86-18013# Navy Personnel Research and Development Center, San Diego, Calif.
COMPUTER-MANAGED INSTRUCTION: CRYSTALLIZED AND FLUID INTELLIGENCE Technical Report, Mar. - Sep. 1984
F. Pat-Anthony Sep. 1985 32 p
(AD-A160017; NPRDC-TR-85-36) Avail: NTIS HC A03/MF A01 CSCL 09/2

Twenty-four measures crystallized intelligence (G sub c) and fluid intelligence (G sub f) were obtained for samples of graduates and failures of an innovative instructional situation in which computer-managed mastery learning was used to teach elementary electricity and electronics. Seven stepwise multiple discriminant analyses and associated statistics were computed to determine which linear combinations of G sub f and G sub c measures would optimally separate the two groups. Corresponding classification functions derived for the discriminant analyses were applied to the data to evaluate the effectiveness of differentiating failures and graduates. The results did not substantiate the hypothesis that G sub f measures would be associated more strongly with student success in a new instructional situation than would G sub c measures. Contrary to theory, the findings suggest that some unconventional educational environments are not necessarily dysfunctional for more able students. In these situations, they can just as easily exercise and exploit those skills developed and applied in more traditional instructional settings. GRA

N86-18014# Maryland Univ., College Park. Dept. of Computer Science.
CHARACTERIZING SOFTWARE WITH OBJECTIVE MEASUREMENTS
D. H. Hutchens May 1985 107 p
(Contract F49620-80-C-001)
(AD-A160018; TR-1504; AFOSR-85-0804TR) Avail: NTIS HC A06/MF A01 CSCL 09/2

This thesis reports on a series of experimental studies performed to determine possible uses of objective software measurements in characterizing and evaluating software. This work revolves around two main themes. The first theme addresses the usefulness of metrices in evaluating the quality of software, particularly as it is related to the errors or changes required during development. It also contains information about how different programming techniques and individual programmers affect the analysis. The second thene addresses program modularity from the prespective of objective software measurements. A technique for automatically determining a hierarchy of modules for a system given its procedure interfaces is presented and evaluated on some class projects and some medium size production software. GRA

N86-18015# California Univ., Berkeley. Center for Pure and Applied Mathematics.
DEVELOPMENT OF AN ACCURATE ALGORITHM FOR EXP(Bt)
B. N. Parlett and K. C. Ng Aug. 1985 29 p
(Contract N00014-76-C-0013)
(AD-A160060; PAM-294) Avail: NTIS HC A03/MF A01 CSCL 09/2

This document describes a program to compute the exponential of a given n by n matrix B multiplied by a scalar tau that is to be thought of as representing time. The authors' primary goal has been to achieve as much accuracy as working precision permits without resorting to stimulated higher precision. The final product is more complicated than they anticipated at the outset. How these complications came to be expected is the theme of this story. The cases considered may be of interest to those who wish to use the matrix exponential in their work. The code acts simply on simple cases. This code is unlikely to be the last word on the computation of exp(Bt) since speed and simplicity deserve some recognition. For simplicity and generality this document considers only complex matrices and only those whose order n is small enough that four n by n arrays fit comfortably in the fast store. In practice the authors expect to have $n<100$. Recall that unless B has special structure, such as being block diagonal, its exponential will have no zero elements. GRA

N86-18016# Duke Univ., Durham, N. C. Dept. of Computer Science.
PERFORMANCE AND RELIABILITY ANALYSIS USING DIRECTED ACYCLIC GRAPHS Technical Report
R. A. Sahner and K. S. Trivedi 4 Apr. 1985 41 p
(Grant AF-AFOSR-0132-84)
(AD-A160313; CS-1985-9; AFOSR-85-0808TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

A computer powerful model for the stochastic analysis of directed acyclic graphs is developed. These graphs represent event-precedence networks where events may occur serially, probabilistically, or concurrently. When a set of events occurs concurrently, the condition for the set of events to complete is that any specified number of the events must complete. This includes the special cases that one or all of the events complete. The distribution function associated with an event is assumed to have exponential polynomial form. Further generality is obtained by allowing these distributions to have a mass at the origin and/or at infinity. The distribution function for the time taken to complete the entire graph is computed in a semi-symbolic form. Applications of the model for the evaluation of concurrent program execution time and to the reliability analysis of fault-tolerant systems are discussed. GRA

N86-18017# Sandia National Labs., Albuquerque, N. Mex.
A COMPARISON OF UNCERTAINTY AND SENSITIVITY ANALYSIS TECHNIQUES FOR COMPUTER MODELS
Ronald L. Iman and Jon C. Helton Mar. 1985 116 p
(Contract DE-AC04-76DP-00789)
(TI85-013272; NUREG/CR-3904; SAND-84-1461) Avail: NTIS HC A06/MF A01

Uncertainty analysis and sensitivity analysis are important elements in the development and implementation of computer models for complex processes. Typically, there are many uncertainties associated with both the development and the application of such models. Understanding of these uncertainties and their causes is required to effectively interpret model behavior. Many different techniques have been proposed for performing uncertainty and sensitivity analyses. The objective of the present study is to compare several widely used techniques on three models having large uncertainties and varying degrees of complexity in order to highlight some of the problem areas that must be addressed in actual applications. The following approaches to undertainty and sensitivity analysis are considered: (1) response surface methodology based on input determined from a fractional factorial design; (2) Latin hypercube sampling with end without regression analysis; and (3) differential analysis. These techniques are compared on the basis of: (1) ease of implementation, (2) flexibility, (3) estimation of the cumulative distribution function of the output, and (4) adaptability to different methods of sensitivity analysis. With respect to these criteria, the technique using Latin hypercube sampling and regression analysis gives the best results overall.
Author

N86-18018# Sandia National Labs., Albuquerque, N. Mex.
A FORTRAN 77 PROGRAM AND USER'S GUIDE FOR THE CALCULATION OF PARTIAL CORRELATION AND STANDARDIZED REGRESSION COEFFICIENTS
Ronald L. Iman, Michael J. Shortencarier, and Jay D. Johnson Jun. 1985 51 p refs
(TI85-016573; NUREG/CR-4122; NRC-A-1339; SAND-85-0044) Avail: NTIS HC A04/MF A01

This document is for users of a computer program developed by the authors at Sandia National Laboratories. The computer program is designed to be used in conjunction with sensitivity analyses of complex computer models. In particular, this program is most useful in analyzing input-outp relationships when the input has been selected using the Latin hypercube sampling program developed at Sandia (Iman and Shortencarier, 1984). The present computer program calculates the partial correlation coefficients and/or the standardization regression coefficients from the multivariate input to, and output from, a computer model. These coefficients can be calculated on either the original observations or on the ranks of the original observations. The coefficients provide alternative measures of the relative contribution (importance) of each of the various inputs to the observed output variations. Relationships between the coefficients and differences in their interpretations are identified. If the computer model output has an associated time or spatial history then the computer program will generate a graph of the coefficients over time or space for each input-variable, output-variable combination of interest, thus indicating the importance of each input over time or space. The computer program is user-friendly and written in FORTRAN 77 to facilitate portability.
DOE

N86-18019# Los Alamos National Lab., N. Mex.
EPIC: AN ERROR PROPAGATION/INQUIRY CODE
Alice L. Baker 1985 6 p Presented at the 26th Annual Meeting of the Institute of Nuclear Materials Management, Albuquerque, N. Mex., 22-25 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015693; LA-UR-85-2565; CONF-850765-13) Avail: NTIS HC A02/MF A01

The use of the computer program EPIC (Error Propagation/Inquiry Code) will be discussed. EPIC calculates the variance of a materials balance closed about a materials balance area (MBA) in a processing plant operated under steady-state conditions. It was designed for use in evaluating the significance of inventory differences in the Department of Energy (DOE) nuclear plants. EPIC rapidly estimates the variance of a materials balance using average plant operating data. The intent is to learn as much as possible about problem areas in a process with simple straightforward calculations assuming a process is running in a steady-state mode. EPIC is designed to be used by plant personnel or others with little computer background. However, the user should be knowledgeable about measurement errors in the system being evaluated and have a limited knowledge of how error terms are combined in error propagation analyses. EPIC contains six variance equations; the appropriate equation is used to calculate the variance at each measurement point. After all of these variances are calculated, the total variance for the MBA is calculated using a simple algebraic sum of variances. The EPIC code runs on any computer that accepts a standard form of the BASIC language.
Author

N86-18020# Bettis Atomic Power Lab., West Mifflin, Pa.
TRANSL: A SUBROUTINE LIBRARY FOR PATRAN-G TRANSLATORS
K. M. Butler Jun. 1985 13 p
(Contract DE-AC11-76PN-00014)
(DE85-017634; WAPD-T-2869) Avail: NTIS HC A02/MF A01

This paper describes the capabilities of the TRANSL subroutine library. This library streamlines the development of interface programs which translate finite element engineering models developed using PATRAN G interactive graphics software to engineering analysis computer programs typically executed on large mainframe computers. PATRAN-G is a powerful graphics program which greatly simplifies the tasks of generating two- or three-dimensional geometry models, creating finite element grids, and applying boundary conditions. In order to convert a PATRAN-G model into a usable input deck for an engineering analysis program, a translator program must be available. Since each analysis program requires its own translator, this becomes a formidable programming task for an organization with many programs developed in-house. TRANSL is a versatile FORTRAN 77 subroutine library which has been written on the VAX 11/78X computer to perform activities which are common to any PATRAN-G translator, such as data storage and manipulation, file handling, and interactive communication with the user. This library has been found to greatly reduce the development time of translator. An example of a translator written for the fluid dynamics program FIDAP is presented in the paper.
DOE

N86-18021# Lawrence Livermore National Lab., Calif.
ORION: AN INTERACTIVE COLOR POST-PROCESSOR FOR TWO DIMENSIONAL FINITE ELEMENT CODES, REVISION 2
J. O. Hallquist and J. L. Levatin Aug. 1985 49 p refs
(DE85-017876; UCID-19310-Rev-2) Avail: NTIS HC A03/MF A01

This report is a user's manual for the post-processor, ORION. ORION reads the binary plot files generated by the two-dimensional finite element codes currently used at LLNL. Contour and color fringe plots of a large number of quantities may be displayed on meshes consisting of triangular and quadrilateral elements. ORION can compute strain measures, interface pressures along slide lines, reaction forces along constrained boundaries, and momentum. ORION runs on the CRAY-1 and VAX computers.
DOE

N86-18022# Oak Ridge National Lab., Tenn.
ALKACYCL: A BASIC COMPUTER PROGRAM FOR THE ANALYSIS OF ALKALI METAL RANKINE POWER CYCLES
J. C. Moyers Aug. 1985 34 p
(Contract DE-AC05-84OR-21400)
(DE85-018125; ORNL/TM-9693) Avail: NTIS HC A03/MF A01

The ALKACYCL is a computer program that analyzes Rankine power cycles utilizing an alkali metal as the cycle working fluid. Cycles may have from zero to three stages of regenerative feed heating. The program is written in BASICA language and can be used on an IBM-PC or PC-compatible computer with 128 kbytes of RAM. Output results include mass and energy balance informa-

tion, cycle efficiency, and sizes and weights for piping and feed heaters. Listing and sample program output are included. DOE

N86-18023# Lawrence Livermore National Lab., Calif.
MFTF-B LOAD-FLOW ANALYSIS: A MAINFRAME APPLICATION IMPLEMENTED ON A PERSONAL COMPUTER
J. H. Wilson and S. Goldberg Jul. 1985 13 p
(Contract W-7405-eng-48)
(DE85-018155; UCID-20452) Avail: NTIS HC A02/MF A01

We have successfully implemented load-flow analysis on the IBM PC-XT/370. This involved obtaining a large program written specifically for the IBM/370 mainframe and adapting it for use on the PC-XT/370. Our procedure was straightforward, and the results we have obtained have been excellent. The procedure described here is useful for updating a large number of mainframe IBM System/370 programs to run on the PC-XT/370, and yields a very powerful computational tool at a very attractive price. DOE

N86-18024# Sandia National Labs., Albuquerque, N. Mex.
MAKING IGES WORK FOR CAD/CAM DATA EXCHANGE
A. L. Ames and S. K. Fletcher 1985 6 p Presented at the CASA/SME Autofact 1985, Detroit, Mich., 4 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE85-015570; SAND-85-0124C; CONF-851164-1) Avail: NTIS HC A02/MF A01

This report outlines Sandia National Laboratories effort to integrate the CAE/CAD/CAM capabilities of three laboratories and six production plants in the DOE weapons complex with the Initial Graphics Exchange Specifications (IGES). The problems with IGES are addressed and solutions are explained. The implementation of the IGES concept is also outlined. DOE

N86-18025# Lawrence Livermore National Lab., Calif.
INTELLIGENT GATEWAY PROCESSORS AS INTEGRATORS OF CAD/CAM NETWORKS
V. E. Hampel, B. L. Garner, and J. R. Matthews Jul. 1985 26 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-7405-eng-48)
(DE85-016287; UCRL-93115; CONF-851125-8) Avail: NTIS HC A03/MF A01

The integration of dissimilar CAD/CAM hardware and software on local and geographically distributed networks is the major problem faced by large organizations today. We begin by examining the existing system for storage, retrieval, control, and distribution of design information at Lawrence Livermore National Laboratory (LLNL) and describe a new prototype Engineering Information System (EIS). We then discuss the Department of Energy neutral Data Exchange Format (DOE/DEF) for the sharing of mechanical drawings among DOE installations. Finally, we describe the potential role of the Intelligent Gateway Processor (IGP) as a transaction controller for engineering resources among contractors of the Air Force Logistics Command (AFLC). IGP capabilities include a unique interpreter-driven user interface which permits the installation and modification of resources and the translation of dissimilar data formats, commands, and protocols, in a unified manner while running non-stop. DOE

N86-18026# Hanford Engineering Development Lab., Richland, Wash.
SIMULATION IN COMPUTER ASSISTED INSTRUCTION
P. R. Gardner 16 Jan. 1985 21 p Presented at the 26th International Conference of the Association for the Development of Computer-Based Instructional Systems (ADCIS), Philadelphia, Pa., 26 Mar. 1985
(Contract DE-AC06-76FF-02170)
(DE85-018208; HEDL-SA-3268-FP; CONF-8503172-1) Avail: NTIS HC A02/MF A01

This package contains the slides/story boards and handouts to be used in a How-To session for new Computer Based Training authors to be presented at the 26th International Conference of the Association for the Development of Computer-Based Instructional Systems. DOE

N86-18027# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
CODES FOR WRITE-ONCE MEMORIES
Frans Merkx Sep. 1984 45 p refs
(ENST-84D004; ISSN-0751-1345) Avail: NTIS HC A03/MF A01

Storage media which consist of a number of write-once bit positions (wits) are considered. A wit initially contains a 0 that may be irreversibly overwritten with a 1. Such a storage medium is called a write-once memory or wom. Examples are punched cards or digital optical disks. With coding, it is possible to use a wom several times, up to a very high rate. An infinite class of wom codes is described. In this class, messages are identified with cosets of linear error-correcting codes. This construction is partially analyzed for binary Hamming codes using finite geometries. Results of simulations of the Hamming wom codes are given, and extensions are described. The Golay wom code is analyzed. Examples indicate connections between wom codes and error detecting codes and memory-protecting. Author (ESA)

N86-18028# Institute of Oceanographic Sciences, Wormley (England).
A STUDY OF ERS-1 RADAR ALTIMETER DATA PROCESSING REQUIREMENTS Final Report
T. H. Guymer, D. J. T. Carter, P. G. Challenor, M. A. Srokosz (University College, London), A. R. Tabor (Centre National pour l'Exploitation des Oceans), C. G. Rapley, N. F. McIntyre (University College, London), R. F. Scott (University College, London), H. D. Griffiths (University College, London), and P. Queffeulou Paris ESA Jan. 1985 268 p refs
(Contract ESA-5681/83/NL-BI)
(ESA-CR(P)-2073) Avail: NTIS HC A12/MF A01

Data processing for the ERS-1 radar altimeter over oceans and sea ice for fast delivery products (near real time processing, onboard or at the ground station) and off line products is discussed. Useful products are identified and, the status of algorithms for extracting the relevant geophysical parameters from sensor data is reviewed. Suggestions concerning retrievals from ERS-1 data taking into account differences between ERS-1 and SEASAT are made. Problems concerning the extraction of wind speed, and the effects of sea surface nonlinearities are considered, and parameters, including a wave period, are proposed. Implications for the overall radar altimeter ground segment philosophy, including the accessibility and dissemination of products and standardization of formats are outlined. Author (ESA)

N86-18029# MATRA Espace, Toulouse (France).
VALIDATION OF A SOFTWARE PACKAGE FOR COMMUNICATION SYSTEMS ANALYSIS AND DESIGN: THE TOPSIM 3 SOFTWARE Final Report
D. Galindo and H. Berthelot Paris ESA 25 Apr. 1985 36 p refs
(Contract ESTEC-5246/82/NL-PP(SC))
(ESA-CR(P)-2075) Avail: NTIS HC A03/MF A01

The TOPSIM 3 software package for communication system modeling and analysis was validated in a performance evaluation of the bit error rate of an on board regenerative repeater. The repeater consists of a 4 GHz modulator, with a 120 Mbps data rate, a transmit and receive filter, and a coherent demodulator, used in phase shift keying transmission links. The telemetry, tracking, and command subsystems of Telecom 1 were used to test phase locked loops, phase modulation, and digital devices. Of 19 tests, 14 are considered good, 4 acceptable, and 1 poor. Recommendations for improving TOPSIM are made. Author (ESA)

N86-18030# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Informatica/Vliegtuigen.
COMPUTER AIDED DESIGN (CAD) AT THE NATIONAL AEROSPACE LABORATORY (NETHERLANDS) WITH THE ACCENT ON AIRCRAFT FLIGHT CONTROL SYSTEMS
W. Loeve and P. J. vanderGeest 24 Mar. 1983 41 p refs In DUTCH; ENGLISH summary Presented at Colloquium Meten en Regelen, Eindhoven, Netherlands, 13 Apr. 1984
(NLR-MP-84032-U; B8568090) Avail: NTIS HC A03/MF A01

The consequences of the integration of CAD-systems within the aircraft industry's infrastructure for information processing and organizational control are elucidated. The possibility to generate the required input for the systems and the usefulness of the output for the design process and ensuing activities are emphasized. It is shown that technical developments with respect to stability and control of aircraft result in the integration of control-technical aspects, alongside those of aerodynamics and structures, within the design process. The development of the tools for designing stability and control systems as part of this integration is described. Author (ESA)

N86-18031# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.

THE USE OF VECTOR COMPUTERS IN AERODYNAMIC COMPUTATIONS

M. E. S. Vogels and A. E. P. Veldman 9 May 1984 30 p refs In DUTCH; ENGLISH summary Presented at the Control Data B.V. Symposium Vectorprogramming, The Hague, Netherlands, 6 Oct. 1983

(NLR-MP-84051-U; B8568096) Avail: NTIS HC A03/MF A01

The costs of sequential software modifications to optimize the use of pipelining vector computers, especially for aerodynamic design processes, are assessed. Restructuring a Spacelab Payloads program describing liquid sloshing under microgravity conditions is tested on a CRAY-1 and a CYBER 205. It is concluded that to make their speed effective, changes to pre- and postprocessing peripheral equipment, software, and mathematical algorithms are needed. Author (ESA)

N86-18032# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.

POSTPROCESSING NLR HIGH SPEED TUNNEL (HST) WIND TUNNEL DATA BY DATA BY MEANS OF ENGINEERING DATA INTERACTIVE PRESENTATION AND ANALYSIS SYSTEM (EDIPAS)

R. K. vanderDraai 12 Sep. 1984 38 p refs Presented at 62nd STA Meeting, Goettingen, West Germany, 10-12 Oct. 1984

(NLR-MP-84083-U; B8568526) Avail: NTIS HC A03/MF A01

Utilizing database, management, and interactive graphics techniques, the Engineering Data Interactive Presentation and Analysis System was designed, and made operational. Applications in the presentation and analysis of wind-tunnel results, including standard presentation of measurements; extensive postprocessing (data reduction); and interactive, creative sessions are outlined. Author (ESA)

N86-18033# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.

ALGEBRAIC DEFINITION OF A SIMPLE PROGRAMMING LANGUAGE

J. A. Bergstra, J. Heering, and P. Klint Feb. 1985 105 p refs Sponsored by European Economic Communities

(CWI-CS-R8504; B8567087) Avail: NTIS HC A06/MF A01

The potential of algebraic specifications for defining programming languages and their processor was assessed by developing a specification for the toy programming language PICO. This specification describes in detail all necessary steps from entering a PICO program in its textual form to computing its value. A major part of this specification is devoted to general techniques for defining programming languages and does not depend on specific properties of PICO. The size of this specification (> 350 axioms) makes it mandatory to use modularization techniques. In the specification formalism polymorphism, infix operators, conditional equations, rules for import and export, and parameterization are tried. Author (ESA)

N86-18034# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.

TRANSITION SYSTEMS, INFINITARY LANGUAGES AND THE SEMANTICS OF UNIFORM CONCURRENCY

J. W. deBakker, J. J. Ch. Meyer (Free Univ., Amsterdam, Netherlands), E. R. Olderog (Kiel Univ., West Germany), and J. I. Zucker (New York Univ., Buffalo) Mar. 1985 14 p refs Submitted for publication Sponsored by European Economic Communities

(CWI-CS-R8506; B8567089) Avail: NTIS HC A02/MF A01

Transition systems as proposed by Hennessy and Plotkin are defined for a series of three programming languages featuring concurrency. The first has shuffle and local nondeterminancy, the second synchronization merge and local nondeterminacy, and the third synchronization merge and global nondeterminacy. The languages are all uniform in the sense that the elementary actions are uninterpreted. Throughout, infinite behavior is taken into account and modelled with infinitary languages in the sense of Nivat. A comparison with denototional semantics is provided. For the first two languages, a linear time model suffices; for the third language a braching time model with processes in the sense of De Bakker and Zucker is described. In the comparison an important role is played by an intermediate semantics in the style of Hoare and Olderog's specification oriented semantics. A variant on the notion of ready set is employed. Precise statements relating the various semantics in terms of a number of abstraction operators are given. Author (ESA)

N86-18035# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.

THE EFFICIENCY OF THE EQUATION INTERPRETER COMPARED WITH THE UNIVERSITY OF NEW HAMPSHIRE (UNH) PROLOG INTERPRETER

J. Heering and P. Klint Apr. 1985 16 p refs Submitted for publication Sponsored by European Economics Communities

(CWI-CS-R8509; B8567092) Avail: NTIS HC A02/MF A01

The Equation Interpreter (a rewrite rule interpreter) and the University of New Hampshire Prolog interpreter for transfroming algebraic specifications into executable prototypes are compared. The Prolog system, which does no preprocessing, performs surprisingly well compared with the Equation Interpreter, which has extensive preprocessing. The preprocessing time (tE) of the Equation Interpreter tends to become prohibitive. The trends in the measurements suggest that the Equation Interpreter outperforms Prolog on large sets of equations. It depends on the particular application which system should be chosen. In prototyping, the same program is probably executed only a few times. In that case, the disadvantage of considerable preprocessing time outweighs the advantage of the shorter execution time. If the number of executions is > no = tE-tp/TP-TE, where tP is Prolog preprocessing (i.e., 0), TP is Prolog execution time, TE is Equation Interpreter execution time, the large preprocessing time of the Equation Interpreter starts to pay off. Author (ESA)

N86-18036# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.

INFINITE STREAMS AND FINITE OBSERVATIONS IN THE SEMANTICS OF UNIFORM CONCURRENCY (PRELIMINARY VERSION)

J. W. deBakker, J.-J. Ch. Meyer, and E.-R. Olderog Apr. 1985 15 p refs Submitted for publication Sponsored by European Economic Communities

(CWI-CS-R8508; B8567091) Avail: NTIS HC A02/MF A01

Two ways of assigning meaning to a programming language with uniform concurrency are compared. The language has uninterpreted elementary actions from which statements are composed using sequential composition, nondeterministic choice, parallel composition with communication, and recursion. The first semantics uses infinite streams in the sense which is a refinement of the linear time semantics of De Bakker, et al. The second semantics uses the finite observations of Hoare et al situated between the divergence and readiness semantics of Olderog and Hoare. It is shown that the two models are isomorphic and that this isomorphism induces an equivalence result between the two semantics. Author (ESA)

N86-18037# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.

TIME-DRIVEN ALGORITHMS FOR DISTRIBUTED CONTROL

Paul M. B. Vitanyi Apr. 1985 31 p refs Submitted for

publication
(CWI-CS-R8510; B8567093) Avail: NTIS HC A03/MF A01

Distributed algorithms for clock synchronization, spanning tree construction and leader-finding in large store-and-forward networks of processors communicating by message passing are investigated. In the synchronization algorithm, the clocks are allowed to drift in value and speed; the message delivery delay is unknown and may change with time. The algorithm for distributed elections and distributed spanning tree construction uses times, yet is logically time-independent. Using time gives better performance in terms of message-passes and passed bits than is possible otherwise, and better performance than by any other known algorithm. The algorithm works correctly for any network topology, under any asynchronicity in the network, and assumes no global knowledge about the network. Author (ESA)

N86-18038# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
STRUCTURAL AND PARAMETRIC IDENTIFICATION OF MULTIPLE INPUT MULTIPLE OUTPUT PROGRAM GUIDE (MIMO) SYSTEMS ACCORDING TO GUIDORZI
J. B. Meertens 12 Oct. 1983 37 p
Avail: NTIS HC A03/MF A01

A guide for changing or extending the GUI program for simulating the structures and parameters of a multi input multi output system is presented. It is conceived for the PDP 11/60 computer. Author (ESA)

N86-18039# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
STRUCTURAL AND PARAMETRIC IDENTIFICATION OF MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SUSTEMS ACCORDING TO GUIDORZI, PROGRAM GUIDE
J. B. Meertens 10 Oct. 1983 34 p
Avail: NTIS HC A03/MF A01

A user guide for the GUI program for simulating the structures and parameters of a multi input multi output system is presented. It is conceived for the PDP 11/60 computer. Author (ESA)

N86-18040# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
STRUCTURAL AND PARAMETRIC IDENTIFICATION OF MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SYSTEMS ACCORDING TO GUIDORZI. FURTHER DEVELOPMENTS AND APPLICATIONS
J. B. Meertens 1983 67 p refs
Avail: NTIS HC A04/MF A01

The method of Guidorzi for the estimation of multiple-input-multiple-output systems is extended with a D-matrix estimator and an estimator of the offset. The method is implemented in a program written for the PDP-11/60 system. Experiments with the program result in good reconstructions of the original outputs of the system. The experiments were run with predefined systems and with industrial systems. Performance in a noise disturbed situation in the first group of experiments shows that with the systems used (four and five dimensional state-vector) good estimation up to a signal-to-noise-ratio of 10dB is possible. The second group of experiments indicates the usefulness of the program for industrial systems. Author (ESA)

N86-18041# Research Inst. of National Defence, Stockholm (Sweden). Dept. 1.
THE VIDEDP MANUAL
Tord Beckman Jun. 1985 92 p refs In SWEDISH; ENGLISH summary
(FOA-C-10212-M4; ISSN-0281-0247) Avail: NTIS HC A05/MF A01

The VIDEDP program manual for printing texts editor VIDED, a system implemented on DEC-10 and DEC-2020 computers is presented. The program was written for Diablo and compatible printing terminals. With VIDEDP it is possible to make underlinings, write accents, use half-line feed for exponents and subscripts, print characters of different size, use Greek and other alphabets, mathematical symbols, frame text and tables, draw simple histograms, use different print wheels in the same text, and control character spacing and line spacing. Author (ESA)

N86-18042# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
CHANNEL CODING WITH THE (255, 255-2T) REED-SOLOMON CODES OVER CF (256)
H. J. Simons and H. F. A. Roefs 20 Dec. 1983 78 p refs
(Contract NIVR-1979)
(NLR-TR-83149-U; B8568395) Avail: NTIS HC A05/MF A01

The encoding and decoding algorithms of (255, 255-2T) Reed-Solomon codes over CF(256) are elaborated. Main computational elements are the discrete Fourier transform for syndrome and error locator computation, Euclid's algorithm for solving the key equation, and Horner's scheme for determining the error values. Computational complexity, in particular the number of multiplications and additions required as a function of T, is discussed. Simulations to demonstrate the quality of the obtained algorithms are presented. Author (ESA)

N86-17284# National Aerospace Lab., Tokyo (Japan).
A BASIC COMPUTER CODE FOR INDUSTRIAL BURNER DESIGNS. PART 1: CAPABILITY TEST IN ISOTHERMAL SWIRLING FLOWS
Kunihisa Eguchi and Shoichi Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 141-148 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17411*# National Aeronautics and Space Administration. Johnson (Lyndon B.) Space Center,
COMPUTER SIMULATION OF ENVIRONMENTAL, HAZARD SCENARIOS IN SPACE
Robert H. Brown *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 309-319 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 09B

N86-17468# MATRA Espace, Toulouse (France).
A COMPUTER ANALYSIS TOOL FOR EVALUATION OF SOLAR ARRAY DESIGN
B. Fieux and J. Masson (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 319-323 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N86-18043 Royal Signals and Radar Establishment, Malvern (England).
ON THE GARBAGE COLLECTION OF BLOCK STRUCTURED MEMORIES
S. R. Wiseman Mar. 1985 28 p refs
(RSRE-85006; BR95552) Avail: NTIS HC A03/MF A01

Scanning, copying, and reference counting garbage collection methods are considered for use in a system where the memory address space is shared by all users of a computer. The problems that arise from this requirement are described. It is shown that no one garbage collector solves all the problems. Author (ESA)

N86-18044 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
THE SCENARIO TEST DRIVER FOR THE ISO NETWORK CONVERGENCE PROTOCOL OVER X.25 (1980)
G. W. Cowin Jun. 1985 27 p refs Sponsored by UK Department of Trade and Industry's Electronics and Avionics Requirement

Board and the EEC
(NPL-DITC-55/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

An ISO network convergence protocol over X.25 (1980) assessment architecture is described. A software tool used to help develop the implementation of this architecture is outlined. This tool, known as the Scenario Test Driver, is an interactive alternative to the automatic test driver used for assessment, permitting closer observation of events. In conjunction with an assessment service, this tool assists implementors during development of their implementations, prior to the stage when formal assessment is appropriate. Author (ESA)

N86-18045 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
IMPLEMENTATION ASSESSMENT OF THE OSI NETWORK SERVICE. THE TEST RESPONDER SPECIFICATION
A. J. W. Carmichael, ed., P. W. Hobson, ed, and A. A. Sweetman, ed. Jun. 1985 148 p refs Sponsored by UK Department of Trade and Industry's Electronics and Avionics Requirements Board and the EEC
(NPL-DITC-56/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

The Test Responder component for use in assessing implementations of the ISO X.25 Convergence Protocol is defined. The Test Responder is implemented on the client's system and is used to provide a controllable and predictable Network Service User. The Test Responder could also provide a tool for use during the development of an implementation. Author (ESA)

N86-18046 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
OVERVIEW OF A TEST SUITE FOR THE ISO NETWORK CONVERGENCE PROTOCOL OVER X.25 (1980)
G. W. Cowin Jun. 1985 26 p refs Sponsored by UK Department of Trade and Industry's Electronic and Avionics Requirement Board and the EEC
(NPL-DITC-59/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Means to assess implementations of high-level protocols, and work directed at the ISO Network Convergence Protocol over X.25 (1980) are described. An architecture to perform such an assessment by running a series of tests exists and the minimum set of tests required to perform such an assessment is defined. Tests are categorized by the phases of the protocol concerned and have an associated name, each having a defined purpose and an expected result. A cross reference for test selection is supplied. Author (ESA)

N86-18047 CIAD, Zoetermeer (Netherlands).
TEST OF INTERGRAPH [TEST INTERGRAPH]
J. J. Duivenvoorden and C. Tjallema 1984 34 p refs In DUTCH
(A-11; ISBN-90-6818-014-2) Copyright. Avail: Issuing Activity

An Intergraph computer aided design (CAD) configuration, containing a VAX-11/751 computer, three disk drives, Interact workstation, Versatec V80 hardcopy unit, and Calcomp 960 plotter, was tested. The system is suited for mechanical, electrical, design plant, and mapping purposes. After base-figure construction, two-dimensional design manipulations, transformations, reflections, rotations, reductions, and rescalings were executed. Line-strings, edgings, parameterized forms, accuracy, design speed, data storage efficiency, coupling possibilities with FORTRAN programs, and data base management system performance, were investigated. An engine, a T-piece with flanges, and a ship's plating, were modeled in three dimensions and combined. The two and three-dimensional integration was examined. For numerical control, pump-cylinder elaborations were executed. Communication possibilities with other CAD-systems were examined. Positive points are: ergonomics; powerful hardware; speed; extension possibilities; multiapplication software; communication possibilities. Negative points are: slow test part execution; shading; frequent use of keyboard; alphanumeric data input; complex 3D-commands were not executed. Author (ESA)

N86-18048 CIAD, Zoetermeer (Netherlands).
TEST OF SUPERDRAFT [TEST SUPERDRAFT]
J. J. Duivenvoorden and P. vanSchaijk 1984 16 p In DUTCH
(A-12; ISBN-90-6818-015-0) Copyright. Avail: Issuing Activity

A Superdraft computer aided design configuration, containing an IBM PC computer, a Graphtec KD 4030 digitizer (A3), an FP 5301 plotter, and a monitor was tested. The system is suited for mechanical engineering. After base figure construction, two-dimensional draw manipulations, transformations, reflections, rotations, reductions, and rescalings were executed. An adapted draw-speed test was carried out. The system provides a lot of two-dimensional design possibilities for the low price. A number of functions might be improved to make the system more up-to-date. Frequent keyboard use is uncomfortable. Author (ESA)

N86-18049# Quail Group, Orem, Utah.
BENCHMARKING: GRAPHICS WORKSTATIONS
B. E. Brown and R. L. Judd 11 Sep. 1985 9 p Presented at the International Conference on Computer Workstations, San Jose, Calif., 11 Nov. 1985 Prepared in cooperation with Lawrence Livermore National Lab., Calif. ssc lh075075
(Contract W-7405-eng-48)
(DE85-018182; UCRL-91032; CONF-851163-2) Avail: NTIS HC A02/MF A01

This paper reports on work being performed to benchmark a new breed of machines, the graphics workstations for scientific and engineering applications. We begin with the history of workstations and how they developed. Many different forces created the graphics workstation. Scientific and engineering calculations are traditionally performed by super computers in a computing center. The graphic workstation was introduced, and this technology was added to the computing environment. The answers we need are ... what can the workstations do and when do we remove the programs or parts of programs from supercomputers and place them on workstations. Benchmarks and what they can and cannot measure are discussed in this light. The particulars about graphics benchmarks and the operating system, including windows, are reviewed, then the benchmarks we are using are described and the results are presented. Since this work is never finished, future plans are also discussed. The emphasis of our work is toward scientific and engineering workstations connected with existing mainframe computers. In the industry today we hear the term JAWS (Just Another WorkStation) when a new workstation is introduced. What does the new product do beyond those on the market. In this paper we present ways to measure and tell the difference between workstations. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-18050 Kansas State Univ., Manhattan.
MICROPROCESSOR CONTROL OF WIND-DRIVEN INDUCTION GENERATORS Ph.D. Thesis
Robert David Richardson 1985 142 p
Avail: Univ. Microfilms Order No. DA8515968

This research proposes a design for a controller for a three-phase wind-driven induction generator using solid state electronics. Two modes of operation are described in this research. In one mode, the generator is operating with resistive heating loads and capacitors for excitation of the generator windings connected at the terminals. In the other mode, the generator is connected by two phases to a single-phase utility service with a balancing load connected to the other generator phase. The electronic design includes the use of a microprocessor and the methods of digital signal processing are used. A fast Fourier

Transform algorithm has been written in software for the microprocessor and has been used with the test apparatus to measure the operating parameters of the generator in the modes of operation that are suggested. A software algorithm flowchart for the controller is described, hardware to implement the controller is suggested, and the experimental data that suggested this design is presented. Dissert. Abstr.

N86-18051 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
NOTES ON LOGIC
D. J. Clapp Jul. 1985 51 p refs
(NPL-DITC-65/1985; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Extensions to classical logic useful in knowledged-based computer systems are presented. Topological logic; many-valued logic; modal logic; temporal logic; nonmonotonic reasoning; relevant entailment logic; intensionality; Montague grammar and intentional logic; and presupposition are introduced. Author (ESA)

N86-18052# Argonne National Lab., Ill. Experimental Breeder Reactor 2 Div.
A COMBINATION OF ARTIFICIAL INTELLIGENCE AND PROCEDURAL LANGUAGE PROGRAMS IN A COMPUTER APPLICATION SYSTEM SUPPORTING NUCLEAR REACTOR OPERATIONS
Rex C. Stratton and George G. Town (Central Washington Univ.) 1985 7 p refs Presented at conference
(DE85-007937; CONF-850903-2) Avail: NTIS HC A02/MF A01

A computer application system is described which provides nuclear reactor power plant operators with an improved decision support system. This system combines traditional computer applications such as graphics display with artificial intelligence methodologies such as reasoned and diagnosis so as to improve plant operability. This paper discusses the issues, and a solution, involved with the system integration of applications developed using traditional and artificial intelligence languages. DOE

N86-18053# Los Alamos National Lab., N. Mex.
EXPERT SYSTEMS FOR DESIGN AND SIMULATION
J. Aldridge, J. Cerutti, W. Draisin, and M. Steuerwalt 1985 43 p Presented at the AIAA/NASA Symposium on Automation, Robotics and Advanced Computing for the National Space Program, Washington, D.C., 4 Sep. 1985
(Contract W-7405-eng-36)
(DE85-017565; LA-UR-85-2838; CONF-8509149-1) Avail: NTIS HC A03/MF A01

We discuss work in progress on two expert systems. We are developing systems that use artificial intelligence techniques to simplify the use of large simulation codes and to help design complicated physical devices. The simulation codes are used in analyzing and designing weapons, and the devices are themselves part of weapon systems. But we focus not only on the particular applications, but also on the broader issues common to design problems: large solution spaces and tentative reasoning. We also discuss some practical difficulties encountered during the project. One expert system provides an interface between users and several simulation codes. It checks input for errors, builds input files for the codes, and submits jobs to a central computing facility. The other expert system helps turn a description of a device into a particular design. Currently this expert system includes three major parts: a translator of descriptions into designs, a graphics interface that presents the design to the user and allows him to manipulate it, and a refiner of designs. The latter is the smartest part of the system, and the target of much of our present efforts. DOE

N86-18054# Oxford Univ. (England). Dept. of Engineering Science.
GENERALIZED PREDICTIVE CONTROL. PART 2: EXTENSIONS AND INTERPRETATIONS
D. W. Carke, C. Mohtadi, and P. S. Tuffs 1984 39 p refs
(OUEL-1557/84-Pt-2) Avail: NTIS HC A03/MF A01

Feedforward compensation and user chosen polynomials giving detuned model-reference, optimal Smith predictor and load disturbance tailoring objectives were added to the basic Generalized Predictive Control (GPC) algorithm. The role of the output and control horizons for processes with nonminimum phase, unstable and variable dead time models are explored. The robustness of the GPC approach to model over and under-parameterization and to fast sampling rates is demonstrated by simulations. Author (ESA)

N86-18055# Oxford Univ. (England). Dept. of Engineering Science.
SELF-TUNING CONTROL: ALGORITHMS AND APPLICATIONS Ph.D. Thesis
P. S. Tuffs 1985 254 p refs Sponsored by UK Science and Engineering Research Council
(OUEL-1567/85) Avail: NTIS HC A12/MF A01

The long term integrity of a self tuning controller is considered. Minimum-variance and pole-placement control approaches are developed from a CARIMA model, rather than from CARMA representation of a process. This is shown to introduce integral action into the control laws, and produces estimation schemes with a zero mean structure. Data conditioning and control signal saturation are considered, and jacketting routines are proposed. Rules for commissioning a self tuning controller are introduced. Two variable forgetting factors are compared in simulation and on a full scale industrial process, and are shown to improve the reliability of a self tuning controller. Application studies which involve cascaded self tuning controllers are presented. Author (ESA)

N86-18056# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
AN EFFICIENT FILTER FOR ABRUPTLY CHANGING SYSTEMS
H. A. P. Blom 25 Jul. 1984 7 p refs Presented at 23rd IEEE Conference on Decision and Control, Las Vegas, Nev., 12-14 Dec. 1984
(NLR-MP-84071-U; B8568106) Avail: NTIS HC A02/MF A01

For a linear discrete time system with coefficients that are governed by an N-state Markov chain, e.g., an aircraft tracked by surveillance radar, a filtering algorithm is defined. It consists of a bank of N interacting Kalman-like filters which communicate with a filter for the Markov chain. When the transition probabilities of the Markov chain are zero, the interacting multiple model (IMM) algorithm reduces to the MM algorithm. Qualitative comparisons with the best other algorithms show an improvement of the ratio between performance and computational complexity up to a factor N. The performance of the IMM algorithm reaches, for small time lags, that of an N times more complex generalized pseudo Bayes algorithm. Author (ESA)

N86-18057# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Meten en Regelen.
DESIGN FOR A PATH CONTROL ALGORITHM OF A ROBOT ARM WITH EXTERNAL SENSOR CONTROL [ONTWERP VOOR EEN BAANREGELING VAN EEN ROBOT ARM ONDER STURING VAN EEN EXTERNE SENSOR]
J. M. Grotenbreg 1983 98 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC A05/MF A01

A robot path control algorithm, which accepts sensor control, was designed, and tested for industrial robots for arc welding. The design uses the hierarchical control concept and is realized using a control computer system. The programs are written using PASCAL, extended for real time use. With this controller it is possible to let the end of the gripper or a tool of a demonstration robot move along a cartesian path. It is possible to control, in real time, the movement of the robot by a sensor simulator. Sensor information may be given in robot or cartesian coordinates. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-18058 Engineering Sciences Data Unit, London (England).
NONLINEAR SYSTEMS: AN INTRODUCTION TO DESCRIBING FUNCTIONS
Jul. 1984 50 p refs Submitted for publication
(ESDU-84009; ISBN-0-85679-471-6; ISSN-0141-3988) Avail: ESDU

ESDU 84009 introduces the use of Describing Functions (DF) to estimate the stability and the steady state response of autonomous closed loop nonlinear systems. The DF uses a single sinusoidal input to the nonlinear element and is herefore classified as a frequency response method. Five DF schemes are given and the characteristics of those DF's when used with eight common nonlinear (combinations of deadzone, saturation, ideal relay, hysteresis and backlash) defined graphically and by their algebraic expressions. Two practical worked examples of third order nonlinear systems illustrate the use of these DF's in stability investigations and show the accuracy with which they estimate the magnitude of the output. These DF's are also used to estimate the frequency and magnitude of a self sustaining, or limit-cycle, oscillation. Author

N86-18059 Technische Univ., Munich (West Germany). Inst. fuer Mathematik.
DIFFERENCE METHODS OF HIGHER ORDER FOR ELLIPTIC BOUNDARY VALUE PROBLEMS WITH CURVED BOUNDARIES [DIFFERENZENVERFAHREN HOHER ORDNUNG FUER ELLIPTISCHE RANDWERTPROBLEME MIT GEKRUEMMTEN RAENDERN]
Reinhard Foessmeier Oct. 1984 106 p refs In GERMAN; ENGLISH summary
(TUM-I8411) Copyright. Avail: Issuing Activity

Difference schemes for elliptic boundary value problems with curved boundaries were developed. The schemes yield solutions with an error expansion by even powers of the mesh size, like Kreiss' method for Dirichlet problems. Extrapolation yields solutions of high accuracy. A modular method for separate treatment of differential equation and boundary conditions is proposed. Low-order error terms occurring because of a joint between Dirichlet and Neumann type boundaries can be eliminated by local corrections. Author (ESA)

N86-18060*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE ALGORITHMS FOR RATIONAL SPLINE INTERPOLATION OF SURFACES
James R. Schiess Jan. 1986 27 p refs
(NASA-TP-2536; L-16045; NAS 1.60:2536) Avail: NTIS HC A03/MF A01 CSCL 20F

Two algorithms for interpolating surfaces with spline functions containing tension parameters are discussed. Both algorithms are based on the tensor products of univariate rational spline functions. The simpler algorithm uses a single tension parameter for the entire surface. This algorithm is generalized to use separate tension parameters for each rectangular subregion. The new algorithm allows for local control of tension on the interpolating surface. Both algorithms are illustrated and the results are compared with the results of bicubic spline and bilinear interpolation of terrain elevation data. Author

N86-18061*# Mississippi State Univ., State College. Dept. of Mathematics and Statistics.
INTERFACE PROCEDURES FOR OVERLAPPING GRIDS
C. Wayne Mastin [1985] 23 p refs
(Grant NsG-1577)
(NASA-CR-176460; NAS 1.26:176460) Avail: NTIS HC A02/MF A01 CSCL 12A

Interpolation at grid boundaries is studied for the purpose of solving partial differential equations using either implicit or conservative explicit finite-difference methods on multi-component overlapping grid systems. Author

N86-18062# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
HARMONIC ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS
Bjoern E. J. Dahlberg and Carlos E. Kenig 1985 125 p refs
(CTH-Math-1985-03; ISSN-0347-2809) Avail: NTIS HC A06/MF A01

Techniques for solving boundary value problems on Lipschitz domain are discussed. Partial differential equations systems applied to several topics are solved. Solution methods for L sup 2 and L sup p are contrasted. Harmonic measure analysis is outlined. For individual titles, see N86-18063 through N86-18064.

N86-18063# Chalmers Univ. of Technology, Goeteborg (Sweden).
DIRICHLET PROBLEM FOR LIPSCHITZ DOMAIN. THE SETUP
Bjoern E. J. Dahlberg *In its* Harmonic Analysis and Partial Differential Equations 1985 69 p refs (For primary document see N86-18062 08-64)
Avail: NTIS HC A06/MF A01

Boundary value problems (BVP) for linear elliptic partial differential equations (PDE) with constants coefficients in Lipschitz-domain, are considered. The BVP are solved in terms of integral equations. The fact that singular integral operators of Calderon-Zygmund Type are L sup p bounded for all p> or = 2 and invertibles, is proved. This method is applied to PDE expressed by BVP such as the Dirichlet problem, Neumann problem, clamped plate problem, elasticity problems and Stoke's equation.
Author (ESA)

N86-18064# Minnesota Univ., Minneapolis. School of Mathematics.
RECENT PROGRESS ON BOUNDARY VALUE PROBLEMS ON LIPSCHITZ DOMAINS
Carlos E. Kenig *In* Chalmers Univ. of Technology Harmonic Analysis and Partial Differential Equations 1985 53 p refs Sponsored by NSF and Alfred P. Sloan Foundation (For primary document see N86-18062 08-64)
(Math-Rept-84-133) Avail: NTIS HC A06/MF A01

Boundary value problems (BVP) on Lipschitz domain (LD) are considered. The BVP is solved using Laplace's equation. Dahlberg's method (analysis of harmonic measure) and Layer potential method are applied. Partial differential equation systems on LD are studied. Systems of elastostatics and Stokes system of hydrostatics are discussed. The Dirichlet problem for biharmonic equations is solved. Author (ESA)

N86-18065# Stanford Univ., Calif. Information Systems Lab.
DIRECTION OF ARRIVAL ESTIMATION OF EIGENSTRUCTURE METHODS WITH UNKNOWN SENSOR GAIN AND PHASE
A. Paulraj and T. Kailath Mar. 1985 5 p
(Contract F49620-79-C-0058)
(AD-A160027; AFOSR-85-0756TR) Avail: NTIS HC A02/MF A01 CSCL 17/3

Direction of arrival estimation by eigenstructure methods requires knowledge of the array covariance matrix and an exact characterization of the array in terms of geometry, sensor gain and phase, etc. It often happens that the actual sensor gain and phase are preturbed from their assumed nominal values. If eigenstructure methods are applied with incorrect sensor parameters, the method essentially breaks down or at best gives poor results. We propose a new approach which uses information in the observed covariance matrix to correct for these effects. This method yields substantially improved performance, a fact illustrated by the results of computer simulations. GRA

N86-18066# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
DIFFERENTIAL METRICS IN PROBABILITY SPACES BASED ON ENTROPY AND DIVERGENCE MEASURES Technical Report
C. R. Rao Apr. 1985 23 p

(Contract F49620-85-C-0008)
(AD-A160301; TR-85-08; AFOSR-85-0864TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper discussed some general methods of metrizing probability spaces through the introduction of a quadratic differential metric in the parameter manifold of a set of probability distributions. These methods extend the investigation made in Rao (1945) where the Fisher information matrix was used to construct the metric, and the geodesic distance was suggested as a measurement of dissimilarity between probability distributions. The basic approach in this paper is first to construct a divergence or a dissimilarity measure between any two probability distributions, and use it to derive a differential metric by considering two distributions whose characterizing parameters are close to each other. One measure of divergence considered is the Jensen difference based on an entropy functional as defined in Rao (1982). Another is the f-divergence measure studied by Csiszar. The latter class leads to the differential metric based on the Fisher informatin matrix. The geodesic distances based on this metric computed by various authors are listed. GRA

N86-18067# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
EXPONENTIAL BOUND FOR ERROR PROBABILITY IN NN-DISCRIMINATION Technical Report
Z. D. Bai Apr. 1985 23 p
(Contract F49620-85-C-0008)
(AD-A160305; TR-85-15; AFOSR-85-0823TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let (theta,X) be a (1,2,...,s) x R to the d power-valued random vector and (theta sub 1, x sub 1),...,(theta sub n, x sub n) be iid. samples drawn from (theta,X). The so-called discrimination problem is to find a function of X, usually depending upon (theta sub n, x sub n),...,(theta sub, x sub n), which is used to predict the value of theta. One of the most frequently used approaches is the nearest neighbor discrimination rule. GRA

N86-18068# California Univ., Berkeley. Lawrence Berkeley Lab.
MAGNETIC CHARGE AND NON-ASSOCIATIVE ALGEBRAS
Murat Guenaydin and Bruno Zumino (California Univ., Berkeley) Feb. 1985 12 p Presented at the Symposium in Honor of G. C. Wick, Pisa, Italy, Oct. 1984 Submitted for publication
(Contract DE-AC03-76SF-00098)
(DE85-009931; LBL-19200) Avail: NTIS HC A02/MF A01

It was pointed out some time ago by Lipkin, Weisberger and Peshkin that the commutators of the velocities of an electron in the field of a print magnetic monopole appear to violate the Jacobi identity at the position where the monopole is located. More recently, a number of authors have observed that such a violation of the Jacobi identity could be related to the existence of a 3-cocycle on the three dimensional translation group for the electron and to a violation of associativity for finite translations. The main observation is that, even if the Jacobi identity is violated (at the Lie-algebra level), the Dirac quantization condition ensures that finite translations (obtained by exponentiation) are associatives in virtue of this quantization condition the phase which measures the degree of non-associativity of finite translations is always of the form exp[1n2w] - 1 where n is an integer. The question remains if it is actually possible that the Jacobi identity is violated. It has been pointed out that, in any formulation of the quantum-mechanical monopole problem in which the coordinates and the velocities of the electron are described by operators in a Hilbert space, the Jacobi identity cannot be violated, since it follows from associativity of the operators acting in a Hilbert space. This is described in some detail for the Dirac string formulation of the monopole problem as well as for the Wu-Yang formulation in terms of local sections. The Jacobi identity can only be violated if the coordinates and velocities of the electron are not operators but belong instead to a non-associative algebra. G.L.C.

N86-18069# Oak Ridge National Lab., Tenn. Engineering Physics and Mathematics Div.
ANOVA MODEL FITTING VIA SPARSE MATRIX COMPUTATIONS
George Ostrouchov 1985 12 p Presented at a conference
(Contract DE-AC05-84OR-21400)
(DE85-017070; CONF-8508115-1) Avail: NTIS HC A02/MF A01

Full matrix methods for fitting large unbalanced ANOVA models require enormous amounts of time and storage. The model matrix X (often called the design matrix) consists of dummy variables and is sparse, thus great reduction in time and storage can be achieved by viewing this as a sparse matrix problem. A method, based on orthogonal Givens factorization of a maximal rank set of sparse columns of X, for fitting a model and computing the residual sum of squares is presented. The selection of a maximal rank set of sparse columns is based on a description of linear dependencies between columns of X that is developed using a notation based on index sets associated with model terms. A comparison of the new algorithm to a full matrix algorithm on a set of models shows that both time and storage requirements are reduced by up to three orders of magnitude for large models and are competitive for small models. DOE

N86-18070# Oak Ridge National Lab., Tenn.
SOFTWARE FOR ROOTFINDING AND INTERPOLATION WITH RUNGE-KUTTA-SARAFYAN METHODS
S. Thompson Sep. 1985 123 p
(Contract DE-AC05-84OR-21400)
(DE85-018113; ORNL-6151) Avail: NTIS HC A06/MF A01

Mathematical software is described which implements Runge-Kutta methods of Sarafyan. Due to the embedded nature of the methods, it is possible to perform both rootfinding and interpolation in a very natural manner. The software described contains provisions for both rootfinding and interpolation. The ability to do rootfinding makes it possible to efficiently handle discontinuities and special events as well as other rootfinding tasks. The ability to do interpolation without negatively impacting the integration stepsize selection process makes it possible to handle the question of dense output in an efficient manner. Examples are presented to illustrate the types of problems which may be solved and to demonstrate the typical performance of the software. DOE

N86-18071# Sandia National Labs., Albuquerque, N. Mex.
SUBROUTINE PACKAGE FOR BESSEL FUNCTIONS OF A COMPLEX ARGUMENT AND NONNEGATIVE ORDER
D. E. Amos May 1985 25 p
(Contract DE-AC04-76DP-00789)
(DE86-000047; SAND-85-1018) Avail: NTIS HC A02/MF A01

The machine implementation of a Bessel function package, which was outlined in mathematical form in two previous documents, is described for Bessel functions H/sub (NU)//sup (1)/(z), H/sub (NU)//sup (2)/(z), I/sub (NU)/(z), J/sub (NU)/(z), K/sub (NU)/(z), Y/sub (NU)/(z) and Airy Functions Ai(z), Ai'(z), Bi(z), Bi'(z) with (NU) greater than or equal to 0 and (-)(PI) < arg z less than or equal to (PI). The less obvious aspects of the implementation are the main topics of interest. These topics include estimation of function magnitudes for underflow and overflow tests, scaling near underflow and overflow limits, the use of recurrence in connection with scaling, the use of machine constant routines and an error package for portability. DOE

N86-18072# Groningen Rijksuniversiteit (Netherlands). Inst. of Mathematics.
ALGORITHMIC ORBIT CLASSIFICATION FOR CONNECTED SOLVABLE GROUPS
Hartmut Buergstein and Wim H. Hesselink Aug. 1984 42 p refs
(ZW-8411) Avail: NTIS HC A03/MF A01

Normal forms for the orbits over the invertible upper triangular matrices in the strictly upper triangular matrices spaces of order n, for n < 8 are discussed. A computer algorithm for the combinatorical problem is given. A reduction method of the combinatorics of weights and roots is considered. A genuine solution is obtained in the case of n < 7; 8500 classes of the case n=8 give an approximative solution. Only 8 of those classes are marked. Author (ESA)

N86-18073# Helsinki Univ. of Technology, Espoo (Finland). Systems Theory Lab.
A STUDY OF THE BACK-AND-FORTH SHOOTING METHOD Ph.D. Thesis
Timo Eirola Jan. 1985 41 p refs Sponsored by Emil Aaltonen Foundation, Foundation of Technology and Walter Ahlstroem Foundation
(Rept-A-3; ISBN-951-753-436-1; ISSN-0781-6480) Avail: NTIS HC A03/MF A01

Methods for solving two-point boundary value problems are reviewed and the stability of the initial-value problems associated with each method is discussed. Back-and-forth shooting method results are summarized. These include an application of the method to the test problems of Holt, modifications of the method, local convergence analysis, and a posteriori error analysis. The method is tested in nonlinear examples and compared with the Riccati method with quasi linearization. The quasi linearization method is slower. Author (ESA)

N86-18074# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
ON THE PREDICTION AND THE SPECTRAL FACTORIZATION OF STATIONARY PROCESSES IN THE BROAD SENSE WITH TWO DISCRETE PARAMETERS
Hayri Korezlioglu and Philippe Loubaton Feb. 1985 19 p refs In FRENCH; ENGLISH summary Submitted for publication
(ENST-85C002; ISSN-0751-1337) Avail: NTIS HC A02/MF A01

Linear prediction in the left half plane and related spectral factorization and decomposition are studied. Complex random variables are defined in a probabilistic space. The necessary and sufficient conditions of nondeterminism are given and proved. The four orthogonal components appearing in the decomposition obtained by the theorem are characterized. Author (ESA)

N86-18075# Oxford Univ. (England). Dept. of Engineering Science.
UNCERTAINTY ESTIMATION FROM SYSTEM IDENTIFICATION
A. P. Loh and I. Postlethwaite 1985 68 p refs Sponsored by UK Science and Research Engineering Council
(OUEL-1570/85) Avail: NTIS HC A04/MF A01

A method to estimate a model for the data generating mechanism and simultaneously obtain a measure of the uncertainty involved in the identification, given input-output records is discussed. It is assumed that the system is stable, finite dimensional, linear and time invariant, and that the inputs are uncorrelated zero mean stochastic processes. Spectral estimation (direct technique), where statistical solutions are proposed by first deriving the appropriate distribution functions and then computing the confidence regions for both the gain and phase corresponding to a particular confidence level at each frequency is used. Via the confidence regions, an estimate for the maximum singular value bound of the system can be obtained. General properties of the identification are highlighted, and it is shown how the modeling error may be identified physically, given that a nominal model is known a priori. Author (ESA)

N86-18076# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
POINT-LINE CHARACTERIZATIONS OF BUILDINGS
Arjeh M. Cohen Dec. 1984 21 p refs Presented at International Mathematics Summer Center (CIME) Meeting on Buildings and the Geometry of Diagrams, Como, Italy, 30 Aug. 1984
(CWI-PM-R8415; B8565121) Avail: NTIS HC A02/MF A01

Lie incidence system and Lie incidence structure are discussed. The construction method of shadow spaces of type B (a building of type M over an index I) over i (i element of I), is given. The analog of the coordinatization theorem for (other) buildings and the classification of geometries with spherical Coxeter diagram, are used. Veblen-Young theorem is proved. A shadow space determined by a building is characterized by the full shadow space (a particular projective space). Characterization theorems are proved. Tits geometry can be identified as a building. Axiomatic theory of shadow spaces is reported. Author (ESA)

N86-18077# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
ON THE HOLOMORPHIC CONTINUATION OF THE IWASAWA AND A RELATED DECOMPOSITION
E. P. vandenBan Jan. 1985 35 p refs Submitted for publication
(CWI-PM-R8502; B8565123) Avail: NTIS HC A03/MF A01

The holomorphic continuation of the complexification of a decomposition of a real semisimple adjoint Lie group, is studied. This decomposition generalizes the Iwasawa decomposition. The results are applied to the analysis on a semisimple symmetric space. Author (ESA)

N86-18078# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
STABILITY, MULTIPLICITY AND GLOBAL CONTINUATION OF SYMMETRIC PERIODIC SOLUTIONS OF A NONLINEAR VOLTERRA INTEGRAL EQUATION
S.-N. Chow (Michigan State Univ., East Lansing), O. Diekmann, and J. Mallet-Paret (Brown Univ.) Jan. 1985 35 p refs Submitted for publication
(Grant NSF MCS-82-01768)
(CWI-AM-R8502; B8565729) Avail: NTIS HC A03/MF A01

Results on existence, multiplicity, stability and global continuation of symmetric periodic solutions of nonlinear scalar Volterra convolution of real variable twice continuously derivable and the behavior in neigborhood of +1 and -1, are studied. Many open problems without Hopf bifurcations are reported. Author (ESA)

N86-18079# Rome Univ. (Italy). Dipt. di Fisica.
INTEGRABILITY OF TWO INTERACTING N-DIMENSIONAL RIGID BODIES
A. M. Perelomov (Institute of Theoretical and Experimental Physics, Moscow), O. Ragnisco, and S. Wojciechowski (Manchester University, UK) 25 Mar. 1985 10 p refs Sponsored by Italian Ministry of Education
(Preprint-450) Avail: NTIS HC A02/MF A01

A class of integrable Euler equations on the Lie algebra to (2n) describing two n-dimensional interacting rigid bodies is found. A Lax representation of equations of motion which depends on a spectral parameter is given and complete integrability is proved. The double Hamiltonian structure and the Lax representation of the general flow is discussed. Author (ESA)

N86-18080# Rome Univ. (Italy). Dipt. di Fisica.
CHIRAL SYMMETRY ON THE LATTICE WITH WILSON FERMIONS
Marco Bochicchio, Luciano Maiani, Guido Martinelli (CNR, Frascati, Italy), Giancarlo Rossi, and Massimo Testa (CNR, Rome) 28 Mar. 1985 45 p refs Sponsored by Italian Ministry of Education
(Preprint-452) Avail: NTIS HC A03/MF A01

The chiral properties of the continuum limit of lattice QCD with Wilson fermions are studied. It is shown that a partially conserved axial current satisfying the usual current algebra requirements can be defined. A proper definition of the chiral symmetry order parameter is given, and the chiral properties of composite operators are investigated. The implications of the analysis for the lattice determination of nonleptonic weak amplitudes are discussed. Author (ESA)

N86-18081# Rome Univ. (Italy). Dipt. di Fisica.
LIE-ISOTOPIC ALGEBRAIC APPROACH TO FORMAL NONPOTENTIAL SCATTERING THEORY
R. Mignani 16 Apr. 1985 15 p refs
(Preprint-456) Avail: NTIS HC A02/MF A01

A preliminary, formal approach to nonpotential scattering theory, based on the Lie-isotopic algebraic structure is given. In the time-dependent case, the central result is an equation for the isotopic evolution operator, which can be solved by a generalization of Magnus' expansion. In the time independent formalism, a purely algebraic isotopic version of Lippmann-Schwinger equations for the Moller operators and of the Born series is obtained. Author (ESA)

N86-18082# European Space Agency. European Space Operations Center, Darmstadt (West Germany).
AN OUTLINE OF THE PRACTICAL USE OF LIE SERIES
J. C. vanderHa and W. R. Burke, ed. (ESA, Paris) Paris ESA Apr. 1985 34 p refs
(ESA-STR-215; ISSN-0379-4067) Avail: NTIS HC A03/MF A01

Lie series are shown to arise naturally in the theory of differential equations when the solution is expanded in a time series. Properties of Lie series are illustrated. The theory is applied to the Kepler problem, resulting in a universal solution involving Stumpff functions. The usefulness of a Lie series approach in perturbation theory (particularly in celestial mechanics) is illustrated. It is demonstrated that the inherent automation of a Lie series approach facilitates the derivation of perturbation solutions, in particular the higher order contributions. Author (ESA)

N86-18083# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
FORMULATION OF A ONE-DIMENSIONAL BOUNDARY INTEGRAL EQUATION FOR THREE-DIMENSIONAL ELASTOSTATIC CORNER PROBLEMS [ZUR FORMULIERUNG EINER EINDIMENSIONALEN RANDINTEGRALGLEICHUNG FUER DREIDIMENSIONALE ELASTOSTATISCHE ECKENPROBLEME]
Hermann Bumb Mar. 1985 20 p refs In GERMAN
(Preprint-886) Avail: NTIS HC A02/MF A01

Numerical solutions for one-dimensional eigenvalue problems were improved using a boundary element method to solve equations of the three-dimensional elasticity theory and for more general corner problems. The singular Dirichlet and Neumann problems for the Laplace operator in a corner are formulated and reduced to a two-dimensional eigenvalue problem of the Laplace-Beltrami operator in a part of the unity sphere using Mellin transformation. This two-dimensional eigenvalue problem is reduced to a one-dimensional boundary integral equation which is formulated. The integral equations are given in stereographic coordinates. It is shown how results can be obtained for the elastic equations from the Laplace equation. Author (ESA)

N86-18084# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
AN AXIOMATIC THEORY OF HETEROGENEITY AND HOMOGENEITY
J. C. A. vanderLubbe 10 May 1985 35 p refs Submitted for publication
(NLR-MP-84054-U; B8568097) Avail: NTIS HC A03/MF A01

It is shown that developments in statistical information theory can contribute to the measurement of heterogeneity and homogeneity. They can lead to a more fundamental and unifying approach and bring together heterogeneity and homogeneity indices in one axiomatically founded theory. A generalized heterogeneity index is introduced axiomatically. Algebraic, analytic, and geometrical properties are investigated. The interpretation of these properties and the choice of the values of the parameters for practical applications are emphasized. Based on this generalized heterogeneity index, it is possible to give an axiomatic characterization for a class of homogeneity indices. The properties of this class are the reverse of those of the heterogeneity index. Potential measures for heterogeneity or homogeneity change are discussed. Author (ESA)

N86-18085# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
BIFURCATION AND STABILITY, A NUMERICAL APPROACH
E. Riks 3 Aug. 1984 36 p refs Presented at 1984 WAM Symposium on Innovative Methods for Nonlinear Problems, New Orleans, La., 11 Dec. 1984
(NLR-MP-84078-U; B8568108) Avail: NTIS HC A03/MF A01

It is shown how existing incremental-iterative procedures can be augmented so that they also deal with the determination of bifurcation points along a nonlinear equilibrium path and the computation of its post-bifurcation branch or branches. It is possible to make a connection with the classical perturbation theory and produce the so-called asymptotic solutions. With these approximations the stability or instability of the bifurcation point can be categorized prior to a continued computation along the branches. Additions of this kind are particularly useful for optimized shell structures where bifurcation buckling is often the critical failure mode. Author (ESA)

N86-18086# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
NUMERICAL INTEGRATION OF RETARDED DIFFERENTIAL EQUATIONS WITH PERIODIC SOLUTIONS
H. Arndt (Bonn Univ.), P. J. vanderHouwen, and B. P. Sommeijer Feb. 1985 15 p refs Submitted for publication
(CWI-NM-R8502; B8567078) Avail: NTIS HC A02/MF A01

The fact that minimax versions of linear multistep methods, derived for ordinary differential equations with periodic solutions, are suitable for the integration of retarded differential equations possessing a periodic solution, is proved. Examples of first order and second order equations are given and numerical results are compared with conventional methods. Author (ESA)

N86-18087# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
COMPUTATION OF ALL THE AMICABLE PAIRS BELOW 10 BILLION
H. J. J. teRiele Mar. 1985 45 p refs Submitted for publication
(CWI-NM-R8503; B8567079) Avail: NTIS HC A03/MF A01

A numerical method for amicable pairs numbers (APN) is described. This method gives all 1427 APN with smaller member below 10 billion. More than 800 new APN are given. Cohen's method for APN is improved. Author (ESA)

N86-18088# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
EXPLICIT RUNGE-KUTTA (-NYSTROEM) METHODS WITH REDUCED PHASE ERRORS FOR COMPUTING OSCILLATING SOLUTIONS
P. J. vanderHouwen and B. P. Sommeijer Apr. 1985 20 p refs
(CWI-NM-R8504; B8567080) Avail: NTIS HC A02/MF A01

Explicit Runge-Kutta (-Nystroem) RK(N) methods for the integration of first (and second) order differential equations having an oscillatory solution are constructed. Phase errors (or dispersion) of the dominant components in the numerical oscillations when these methods are applied to a linear, homogeneous test model are discussed. Several RK(N) methods which are dispersive of orders up to 10, whereas the (algebric) order of accuracy is only 2 or 3, are constructed. Application of these methods to semidiscretized hyperbolic equations and to equations describing free and weakly forced oscillations reveals that the phase errors can be significantly reduced. Author (ESA)

N86-18089# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
CONVERGENCE AND ORDER REDUCTION OF DIAGONALLY IMPLICIT RUNGE-KUTTA SCHEMES IN THE METHOD OF LINES
J. G. Verwer May 1985 18 p refs Submitted for publication
(CWI-NM-R8506; B8567082) Avail: NTIS HC A02/MF A01

Diagonally implicit Runge-Kutta discretizations of initial-boundary value problems in partial differential equations are studied. The derivation of bounds for the full discretization error under the assumption that the grid distances in space and time are independent parameters, is considered. The method of lines approach is used to exploit the B-convergence theory for Runge-Kutta schemes applied to stiff problems. Order reduction phenomena are emphasized. Numerical examples confirm theoretical results. It is shown that in partial differential equations, order reduction severely reduces the performances of higher order schemes. Author (ESA)

N86-18090# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
PREDICTOR-CORRECTOR METHODS FOR PERIODIC SECOND-ORDER INITIAL VALUE PROBLEMS

P. J. vanderHouwen and B. P. Sommeijer Jun. 1985 20 p refs Submitted for publication
(CWI-NM-R8509; B8567083) Avail: NTIS HC A02/MF A01

Predictor-corrector methods for the accurate representation of the eigenmodes in the solution of second-order differential equations without first derivatives are constructed. The methods have (algebraic) order 4 and 6, and phase errors of orders up to 10. For linear and weakly nonlinear problems where homogeneous solution components dominate, the methods are considerably more accurate than conventional methods. Author (ESA)

N86-18091# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
DISCRETIZATION OF HYPERBOLIC DIFFERENTIAL EQUATIONS WITH PERIODIC SOLUTIONS
P. J. vanderHouwen Jun. 1985 8 p refs Submitted for publication
(CWI-NM-R8510; B8567084) Avail: NTIS HC A02/MF A01

A method of lines applied to discretization of hyperbolic differential equations with periodic solutions, is considered. The resulting system of ordinary differential equations is solved. Difference operators which can be tuned to dominant frequencies are studied. Time interrogators for periodic solutions are discussed. A space discretization formula is given. Numerical experiments of fluid dynamics are reported. Author (ESA)

N86-18092# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
SYNTAX AND DEFINING EQUATIONS FOR AN INTERRUPT MECHANISM IN PROCESS ALGEBRA
J. C. M. Baeten, J. A. Bergstra, and J. W. Klop Feb. 1985 49 p refs Submitted for publication Sponsored by European Economic Communities
(CWI-CS-R8503; B8567086) Avail: NTIS HC A03/MF A01

A mechanism to describe priorities in the algebra of communicating processes, whereby some actions have priority over others in a nondeterministic choice (or sum) is introduced. The mechanism can be used to model the working of interrupts in a distributed system. This is illustrated in an example. Author (ESA)

N86-18093# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/Algorithms and Architecture.
IMPLEMENTATION OF A NEW PRIMALITY TEST
H. Cohen (Bordeaux Univ., Talence, France) and A. K. Lenstra Mar. 1985 32 p refs
(CWI-CS-R8505; B8567088) Avail: NTIS HC A03/MF A01

An implementation of the Cohen-Lenstra version of the Adleman-Pomerance-Rumely primality test is presented. Primality of prime numbers of up to 213 decimal digits can routinely be proved within 10 min, on a CDC 170/750, CDC 205, or Cray 1 computer. Author (ESA)

N86-18094# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
ON THE CONSISTENCY OF KOOMEN'S FAIR ABSTRACTION RULE
J. C. M. Baeten, J. A. Bergstra, and J. W. Klop May 1985 42 p refs Submitted for publication Sponsored by Esprit Project METEOR
(CWI-CS-R8511; B8567094) Avail: NTIS HC A03/MF A01

A graph model for the algebra of communicating processes with silent steps (ACP), in which Koomen's fair abstraction rule holds, is constructed. An approximation induction principle, the recursive definition principle and recursive specification principle, are formulated. The fact that for the ACP each computably recursively definable process is finitely recursively definable is proved. This property does not hold when the abstraction in ACP is not used. Author (ESA)

N86-18095# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A GENERALIZED DIAGRAM FOR VARIOUS PARAMETER ESTIMATION METHODS; THE COHERENCE IN PSEUDO-LINEAR REGRESSION SCHEMES
A. J. W. vandenBoom and P. Eykhoff Jul. 1983 7 p refs
(ER-83/07) Avail: NTIS HC A02/MF A01

The relationships between recursive estimation schemes for single-input single-output systems are established by presenting a general diagram of which well-known estimators are special cases (least-squares, generalized least squares, extended matrix method, instrumental variable method, approximated maximum likelihood, implicit quasi-linearization, filtered instrumental variable estimator, (sub) optimal instrumental variable estimator and the instrumental variable variant of the extended matrix method). In the diagram, three important operations can be distinguished: noise filtering, model extension, and instrumental variable generation. It is shown that by proper combination of these three main operations, all the mentioned estimators can be constructed. Author (ESA)

N86-18096# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
WAVEFORM VECTOR QUANTIZATION: THE ALGEBRAIC APPROACH [LA QUANTIFICATION VECTORIELLE DE FORME D'ONDES: APPROCHE ALGEBRIQUE]
Jean-Pierre Adoul May 1985 54 p refs In FRENCH; ENGLISH summary Presented at Groupement des Acousticiens de Langue Franc. Seminar, Paris, France, 14 Feb. 1985 Submitted for publication
(ENST-85C004; ISSN-0751-1337) Avail: NTIS HC A04/MF A01

Vector and scalar quantization for Gaussian and uniform distributions are compared, demonstrating the superiority of the first even if the vector components are statistically independent. Spherical vector quantization is investigated. The norm and the vector orientation are quantified separately. Such a quantizer requires the specification of a set of normalized vectors which are possible rounded-off values for the orientation. Regular lattice points such as the hexagonal lattice in two dimensions offer the possibility of specifiying a large number of vectors of R exp m form a few basis vectors. Author (ESA)

N86-18097# Technische Hogeschool, Delft (Netherlands). Vakgroep Stromingsleer.
ON THE NUMERICAL EVALUATION OF BESSEL FUNCTIONS OF FIRST, SECOND AND THIRD KIND OF COMPLEX ARGUMENT AND INTEGER ORDERS
G. D. C. Kuiken Apr. 1985 7 p refs
(MEAH-54) Avail: NTIS HC A02/MF A01

The double precision of the Bessel functions of integer orders in the entire complex plane is discussed. The Hankel asymptotic expansions are used. Significant digits are lost in solution of Bessel's equation due to essential singularity at zero or due to truncation and round-off. Poisson's summation formulas are used to compute the Bessel equation of the first kind with arbitary small error. Author (ESA)

N86-18098# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
PERFORMANCE EVALUATION OF NONLINEAR OPTIMIZATION METHODS VIA PAIRWISE COMPARISON AND FUZZY NUMBER
F. A. Lootsma 1984 38 p refs Presented at NATO Advanced Study Institute on Computational Mathematical Programming, Bad Windsheim, West Germany, 23 Jul. - 2 Aug. 1984 Revised Submitted for publication
(Rept-84-40) Avail: NTIS HC A03/MF A01

The deterministic performance evaluation of nonlinear optimization methods is discussed. The concept of fuzzy numbers with triangular membership functions is given. The algebraic operations of fuzzy numbers can be interpreted as simple real numbers operations. A pairwise comparison using fuzzy estimates of the performance ratios to obtain fuzzy final scores of the methods under consideration is reported. The fuzzy performance evaluation by the ranking and rating of five methods for solving geometric programming problems is studied. Author (ESA)

N86-18099# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
AN AUTOMATIC PROOF PROCEDURE FOR SEVERAL GEOMETRIES (REPORT 1)
Th. Bruyn and H. L. Claasen 1984 54 p refs
(Rept-84-42; Rept-1) Avail: NTIS HC A04/MF A01

The projective geometry over a group of 2x2 matrices with real coefficients is considered. The procedures for proofs of theorems in several geometries which can be executed in a computer are given. The outlook for ruler and compass construction is assessed. The fact of Desargues' theorem is deduced from Papus' theorem is proved. Author (ESA)

N86-17288# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL GRID GENERATION USING ALGEBRAIC AND GEOMETRICAL TECHNIQUES
Takuya Matsuda and Eiji Shima *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 183-190 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-18100# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
REALIZATION AND APPROXIMATION OF STATIONARY STOCHASTIC PROCESSES
Yehuda Avniel Feb. 1985 88 p
(Contract DAAG29-84-K-0005; Grant AF-AFOSR-0135-82; AF Proj. 2304)
(AD-A158996; LIDS-TH-1440; AFOSR-85-0674TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

To a multivariate stationary stochastic process, the author associates a scattering matrix S, which measures the interaction between the past and future of the process. This matrix valued function can be viewed as the generalized phase function associated with the spectral density. It determines the density up to congruency only for a completely non-deterministic sequence. Using the theory of Adamjan-Arov-Krein on extensions of Hankel operators, it is established that the Hankel operator H sub S determines the Laurent operator L sub S as its unique norm preserving lifting. Employing the Nagy-Foias theory on unitary dilations, or its dual, Lax-Phillips scattering operator model, a realization theory for equivalent classes of stationary sequences with the same density is developed. The minimal equivalence class of Markovian representations is induced by the coprime factorization of the scattering matrix. This presents a unified approach to stochastic and deterministic realization theory, with S as the analog of the frequency response function. Author (GRA)

N86-18101# Missouri Univ., Rolla. Dept. of Mathematics and Statistics.
POWER SERIES APPROXIMATIONS TO THE NULL DISTRIBUTIONS OF SOME CHI-BAR-SQUARE STATISTICS Interim Report
B. Singh and F. T. Wright Sep. 1985 23 p Prepared in cooperation with Memphis State Univ., Tenn.
(Contract N00014-80-C-0322)
(AD-A159785) Avail: NTIS HC A02/MF A01 CSCL 12/1

Some power series approximations to the exact null distribution of the Chi-bar-square statistic for several testing situations are developed using the first four cumulants of the null distributions, and their performance is investigated numerically. The series expansions use Laguerre polynomials and the associated gamma densities. Chi-bar-square statistics arise when testing the homogeneity of normal means with the alternative restricted by a partial ordering on the means and when testing the ordering against all alternatives. Approximations are provided for the case of a total order and a simple tree with equal, or nearly equal, sample sizes. The numerical investigations indicate the accuracy and usefulness of these approximations. Author (GRA)

N86-18102# Naval Postgraduate School, Monterey, Calif.
RANDOM PARAMETER MARKOV POPULATION PROCESS MODELS AND THEIR LIKELIHOOD, BAYES AND EMPIRICAL BAYES ANALYSIS
D. P. Gaver and J. P. Lehoczky Sep. 1985 29 p
(AD-A159812; NPS55-85-020) Avail: NTIS HC A03/MF A01 CSCL 12/1

Markov population stochastic processes are useful in describing repairman and logistics problems, networks of queues, pharmacological processes, and manpower situations. This paper considers statistical estimation problems arising for such mathematical models. Parameter estimation of an empirical Bayes nature, with limited shrinkage or discrepancy tolerant features is discussed and illustrated. Author (GRA)

N86-18103# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
BROWNIAN MOTION
I. Karatzas and S. E. Shreve Jul. 1985 447 p
(Contract DAAG29-84-K-0005)
(AD-A160020; LIDS-R-1485; ARO-20980.30-MA) Avail: NTIS HC A19/MF A01 CSCL 07/4

The most fundamental concepts in the theory of stochastic processes are the Markov property and the martingale property. This book is written for those who are familiar with both of these ideas in the discrete-time setting, and who now wish to explore stochastic processes in the continuous-time context. It has been our goal to write a systematic and thorough exposition of this subject, leading in many instances to the frontiers of knowledge. At the same time, we have endeavored to keep the mathematical prerequisities as low as possible, namely, knowledge of measure-theoretic probability and some acquaintance with discrete-time processes. The vehicle we have chosen for this task is Brownian motion, which we present as the canonical example of both a Markov process and a martingale in continuous time. We support this point of view by showing how by means of stochastic integration and random time change, all continuous martingales and a multitude of continuous Markov processes can be represented in terms of Brownian motion. This approach forces us to leave aside those processes which do not have continuous paths. Thus, the Poisson process is not a primary object of study, although it is developed to be used as a tool when we later study passage times of Brownian motion. GRA

N86-18104# American Inst. for Research, Washington, D.C.
FORECASTING DEVICE EFFECTIVENESS. VOLUME 3: ANALYTIC ASSESSMENT OF DEVICE EFFECTIVENESS FORECASTING TECHNIQUE Final Report, Aug. 1983 - Dec. 1984
A. M. Rose, A. W. Martin, and L. G. Yates Jun. 1985 85 p
(Contract MDA903-82-C-0414; DA Proj. 2Q2-63744795)
(AD-A160029; ARI-TR-681-Vol-3) Avail: NTIS HC A05/MF A01 CSCL 12/1

Several analytic procedures were conducted to address various aspects of the scalar properties of the Device Effectiveness Forecasting Technique (DEFT). These procedures included Monte Carlo simulations to assess the interpretation of DEFT output, sensitivity of DEFT parameters, comparison of outputs, stability, and interrater agreement. Results indicated that it would be necessary to incorporate assumptions regarding expected distributions of input variables in order to meaningfully interpret DEFT output. Also, the Monte Carlo analyses demonstrated the sensitivity of DEFT output scores to variations in inputs, and assessed the effects of various assumptions regarding measurement error on output scores. The interrater agreement issue was addressed by having several raters apply DEFT to the three actual training devices. Results indicated a high degree of consistency among raters for all devices for all levels of DEFT. GRA

N86-18105# Stanford Univ., Calif. Dept. of Physics.
THE INDEXING PROPERTIES OF AN ANCILLARY STATISTIC
A. Y. C. Kuk 28 Aug. 1985 22 p
(Contract N00014-76-C-0475)
(AD-A160030; TR-363) Avail: NTIS HC A02/MF A01 CSCL 12/1

The role of an ancillary statistic as an information and as a precision index is discussed. For transformation models, it can be shown that, in some sense, two samples with the same ancillary statistic value contain the same amount of information. For both transformation and exponential models, the variance of the conditional Fisher information is proportional to the square of the statistical curvature. It appears that the constancy of statistical curvature is related to the concept of exact precision index.
Author (GRA)

N86-18106# Stanford Univ., Calif. Dept. of Statistics.
HOW MANY BOOTSTRAPS?
R. Tibshirani 22 Aug. 1985 16 p
(Contract N00014-76-C-0475)
(AD-A160043; TR-362) Avail: NTIS HC A02/MF A01 CSCL 12/1

The bootstrap is a non-parametric method for assessing statistical accuracy. In approximating bootstrap quantities by Monte Carlo simulation, one must decide how many bootstrap samples to generate. This document proposes an adaptive sequential method that estimates the accuracy based on the current bootstrap samples. Bootstrap sampling is continued until the estimated accuracy is high enough. In the examples given, 100 to 300 bootstraps are sufficient for standard error and bias estimation, while 1000 bootstraps may be necessary for estimating a percentile.
GRA

N86-18107# Stanford Univ., Calif. Dept. of Operations Research.
MODIFIED CONFIDENCE INTERVALS FOR THE MEAN OF AN AUTOREGRESSIVE PROCESS
B. D. Titus Aug. 1985 108 p
(Contract DAAG29-84-K-0030; Grant NSF MCS-82-03483)
(AD-A160055; TR-9; ARO-20927.9-MA) Avail: NTIS HC A06/MF A01 CSCL 12/1

The author's motivation is to find asymptotically more accurate confidence intervals for the steady state mean of a simulated process. By this he means that the coverage probability error for the confidence intervals we derive should be of lower order than that of standard confidence intervals. There are several standard methods of setting confidence intervals in simulations, including the regenerative method, batch means, and time series methods. He focuses on improved confidence intervals for the mean of an autoregressive process, and as such our results are useful outside of a simulation setting.
GRA

N86-18108# South Carolina Univ., Columbia.
ON THE ASYMPTOTIC PROPERTIES OF A KERNEL-TYPE QUANTILE ESTIMATOR FROM CENSORED SAMPLES Technical Report
Y. O. Lio, W. J. Padgett, and K. F. Yu May 1985 17 p
(Grant AF-AFOSR-0156-84)
(AD-A160302; TR-104; AFOSR-85-0865TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In reliability and medical studies, it is often of interest to estimate various quantiles of the unknown lifetime distribution. In particular, the median lifetime and extreme quantiles are of interest to the experimenter in such studies. In many life testing and medical follow-up experiments, however, arbitrarily right-censored data arise, and it is important to be able to estimate the quantiles of interest based on the censored data. For such data, some kernel-type quantile estimators are considered in this paper which give smoother estimates than the usual product-limit quantile function.
GRA

N86-18109# Rome Univ. (Italy). Dipt. di Fisica.
A NEW PROPOSAL FOR THE DETERMINATION OF THE RENORMALIZATION GROUP TRAJECTORIES BY MONTE CARLO RENORMALIZATION GROUP METHOD
M. Falcioni, G. Martinelli (CNR, Frascati, Italy), M. L. Paciello (CNR, Rome), G. Parisi (CNR, Rome), and B. Taglienti 15 Apr. 1985 19 p refs
(Preprint-453) Avail: NTIS HC A02/MF A01

A method based on Schwinger-Dyson equations for calculating block renormalized couplings by Monte Carlo renormalization group is presented. A numerical study for the 2-dimensional 0(3) nonlinear sigma-model is done. Results show that the method can be safely used to determine the renormalization group trajectory at any values of the coupling constants, and can be applied to a variety of interesting cases including four-dimensional lattice gauge theories. However it seems unlikely that it can be used to determine the Beta function of the theory with the necessary accuracy. The total VAX 11/780 CPU time used to produce all the data is 170 hr.
Author (ESA)

N86-18110# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A MARKOVIAN MODEL, WITH STATE-DEPENDENT PARAMETERS, OF A TRANSACTIONAL SYSTEM SUPPORTED BY CHECKPOINTING AND RECOVERY STRATEGIES
V. F. Nicola and F. J. Kylstra 1985 19 p refs
Avail: NTIS HC A02/MF A01

A Markovian model of a transactional system supported with checkpointing and recovery strategies to guarantee reliable operation is considered. The model allows representations with state-dependent parameters. Algorithms for the computation of the state probabilities (and the performance variables) and their sensitivities with respect to the model parameters are presented. In the case of state-independent parameters, a state-space analysis approach for the derivation of analytic expressions for the performance variables is demonstrated. The optimization of performance criteria, such as the system availability and the mean response time of a transaction, is discussed.
Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-18111# Lawrence Livermore National Lab., Calif.
PARAMETRIC STUDY OF THE AMPLIFICATION FACTOR IN THE ENERGY BALANCE METHOD
R. C. Chun and T. Y. Chuang 1 Apr. 1985 27 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami Beach, Fla., 17-22 Nov. 1985 Sponsored in part by the Nuclear Regulatory Commission, Washington, D.C.
(TI85-010472; UCRL-92443; CONF-851124-2) Avail: NTIS HC A03/MF A01

This paper represents a parametric study of the amplification factor to account for rebound effects in the Energy Balance Method. Of the 66 distinct cases we chose for our parametric study, the amplification factor of 1.1 seems sufficient except in four borderline cases where the carbon steel pipes are small or have very small gaps between the pipes and the pipe whip restraints. We conclude that the amplification factor generally decreases as the parameters gap size, hinge-to-break distance and overhang increase.
DOE

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-18112# Rome Univ. (Italy). Dipt. di Fisica.
NONLINEAR EVOLUTION EQUATIONS ASSOCIATED WITH THE CHIRAL FIELD SPECTRAL PROBLEM
M. Bruschi and O. Ragnisco 16 Apr. 1985 32 p refs
(Preprint-455) Avail: NTIS HC A03/MF A01

The class of nonlinear evolution equations associated with the linear problem Psi x = Lambda A Psi is derived. It turns out that the chiral field equation, the nonlinear Klein-Gordon equations, the Heisenberg and Papanicolau spin chain models, the modified Boussinesq equation, and the Wadati-Konno-Ichikawa equations pertain to this class. The Backlund transformations for such a class are used to derive the one-soliton solution in a special case. Author (ESA)

N86-18113# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
AN INTRODUCTORY COMPARATIVE STUDY OF THE HOPF BIFURCATION METHOD AND THE DEE HARMONIC BALANCE METHOD [EEN INLIEDENDE STUDIE NAAR HOPH-BIFURCATIEMETHODE IN VERGELIJKING MET DEE METHODE VAN DE HARMONISCHE BALANS]
E. vanderGiessen Oct. 1983 39 p refs In DUTCH
(Lab-Rept-757) Avail: NTIS HC A03/MF A01

The Hopf bifurcation method and the harmonic balance method used to solve the hunting behavior when railroad vehicles exceed a critical speed were compared. Only 2x2-systems were considered. The Hopf bifurcation theory is explained. A conveyor problem was treated with both methods. The application of both methods in general, second order, autonomous, nonlinear differential equations was considered. The bifurcation point is calculated in the same way and with approximately the same effort with both methods. The periodic solutions in the neighborhood are much easier to find with the Hopf bifurcation method. Contrary to the Hopf bifurcation theory, the harmonic balance method does not give a decisive answer as to the stability of periodic solutions.
Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-18114# Lawrence Livermore National Lab., Calif.
CONCEPTUAL APPROACH TO THE DESIGN OF 50-TESLA HYPER-FIELD SUPERCONDUCTING MAGNETIC COILS
R. W. Hoard 26 Aug. 1985 20 p
(Contract W-7405-eng-48)
(DE85-017881; UCID-20511) Avail: NTIS HC A02/MF A01

Perhaps one of the principle advantages of the open-ended geometry afforded by the mirror fusion reactor designs, in contrast to that of the tokamak proposals, is the potential future upgradability of these systems to also encompass advanced fusion fuel cycles. This is the combined result of both the ability to convert the energy of the escaping charged particles directly into electricity and from a magnet design viewpoint; the much higher required containment field strengths (between 40 to 50 T in the mirror choke coils and approximately 12 T in the central cell magnets) dictate that the tokamak geometry lacks adequate real estate for structural support against the resulting electromagnetic stresses. The latter consideration is highlighted by F. Moon's report on the Virial Theorem, which states that the minimal amount of structural mass needed for a magnet scales as both the magnetic stored energy and a multiplicative factor that increases with the geometric complexity of the proposed magnet system. Solenoids are, of course, the simplest source of fields, which implies that if strengths of 40 to 50 T are indeed possible, we should first seek their production in this geometry. DOE

N86-18115# Arkansas Univ., Little Rock. Dept. of Electronics and Instrumentation.
REAL-TIME MEASUREMENT AND CALIBRATION OF PARTICLE CHARGE: A COMPARISON BETWEEN DMA AND E-SPART ANALYZER
D. Cramer, R. E. Ware, G. S. Ballard, and M. K. Mazumder Sep. 1985 7 p
(Contract W-7405-eng-48)
(DE86-000019; UCRL-15621) Avail: NTIS HC A02/MF A01

An electrical-single particle aerodynamic relaxation time (E-SPART) analyzer was used to measure, in real time, the electrostatic charge and aerodynamic size distributions of aerosol particles on an individual basis. A TSI Model 3071 differential mobility analyzer (DMA) was used to classify the test aerosol particles according to their electrical mobility as an independent means of charge calibration. Measurements were performed in a range of 0 to +-200 electronic charges. Experimental data show a close agreement between the electrostatic charge classification by DMA and the measurements obtained by the E-SPART analyzers. DOE

N86-18116# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
LORENTZ ANOMALY IN ARBITRARY DIMENSIONS
T. Matsuki Jan. 1985 8 p
(Contract DE-AS05-77ER-05490)
(DE86-001332; DOE/ER-05490/63) Avail: NTIS HC A02/MF A01

It is shown that the Lorentz invariance is broken in gauge theories of chiral Weyl fermions in flat space-time via one-loop quantum corrections. Abelian gauge fields contribute to this anomaly in even dimensions larger than or equal to four and non-Abelian gauge fields do in even dimensions larger than or equal to six. The anomaly is proportional to D/2 - 1 power to the charge, where D is a number of space-time dimensions. DOE

N86-18117# Vacuumschmelze G.m.b.H., Berlin (West Germany).
FAST MAGNETIC SYSTEMS, BASIC RESEARCH Final Report, Jun. 1983
Ludwig Erd, Hubert Hoefer, Dieter Maiwald, and Klaus Menzel Bonn, West Germany Bundesministerium fuer Forschung und Technologie Sep. 1985 167 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-102; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

Static and periodic field problems of electromechanical energy transducers were solved numerically using the vector potential with linear positioning motors with permanent magnetic excitation. Power loss and impedance values were calculated. The magneto-static field distributions were numerically calculated for moving coil motors with magnetic retaining force. The flux dynamics and energy balance of solid and laminated magnet yokes were experimentally studied on fast clapper magnet systems for printers. The measured results show good agreement with the numerical results obtained with an automatic measuring equipment supported by computer systems. Author (ESA)

N86-18118# Stichting voor Fundamenteel Onderzoek der Materie, Amsterdam (Netherlands).
[ACTIVITIES REPORT IN FUNDAMENTAL RESEARCH ON MATTER (FOM)] Annual Report, 1983 [JAARBOEK '83]
1983 161 p refs Partly in DUTCH and ENGLISH
Avail: NTIS HC A08/MF A01

Nuclear, atomic, molecular, solid state, thermonuclear, plasma, theoretical high energy physics, and semiconductor research was carried out. The reciprocity of electrons and phonons and magnetic impurities was studied using a point-contact spectroscopy method. Transitions of internal energy levels of colliding particles in a radiation field (lasers), were investigated. Experiments concerning possibilities of a Bose-Einstein condensation of He3 quasi-particles gas dissolved in He4 superfluid, were carried out. An electroncyclotron emission polychromator, to study instabilities, gyrotron heating, and fuel injection in tokamak devices, was developed.
Author (ESA)

N86-18119# Technische Physische Dienst TNO-TH, Delft (Netherlands).
[ACTIVITIES REPORT IN APPLIED PHYSICS] Annual Report, 1984 [JAARVERSLAG '84]
1984 61 p refs Partly in DUTCH and ENGLISH

Avail: NTIS HC A04/MF A01

Research concerning acoustics, heat, architecture, materials research, and (optical) instrumentation is presented; active noise control and acoustic path identification were investigated. Energy conservation, solar energy, and building physics activities were carried out. Ultraviolet absorbing glasses, glass fibers, sheet glass, and aluminium and silicon oxynitrides, were studied. Glass fiber based sensor and laser applications, and optical space-instrumentation are discussed. Signal processing, sensors, and integrated electronics applications were developed. Scale model experiments for flow induced noise and vibrations, caused by engines, ventilators, wind turbines, and propellers, were executed. A multispectral charge coupled device airborne scanner, with four modules (one for forward observations) is described. A ground radar, based on seismic exploration signal processing and used for the location of pipes, sewers and cables, was developed.

Author (ESA)

N86-17651# Joint Publications Research Service, Arlington, Va.
MAGNETIZATION REVERSAL IN TRIAXIAL SINGLE-DOMAIN PARTICLES

Viktor Avramovich Kufa and Ivan Petrovich Stadnik *In its* USSR Report: Electronics and Electrical Engineerings (JPRS-UEE-84-016) 30 Nov. 1984 p 39 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 5-8 (For primary document see N86-17640 08-31)

Avail: NTIS HC A03/MF A01

N86-17652# Joint Publications Research Service, Arlington, Va.
DETERMINING SPATIAL ORIENTATION OF AXES OF ELLIPTICAL MAGNETIC FIELD

Leonid Mikhaylovich Rudnitskiy, Valeriy LVovich Frumin, Boris Avramovich Guyetskiy, and Nikolay Zekharovich Klimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 8-11 (For primary document see N86-17640 08-33)

Avail: NTIS HC A03/MF A01

N86-17653# Joint Publications Research Service, Arlington, Va.
MAGNETIC FIELD OF EXCITATION WINDING IN EXPERIMENTAL CRYOGENIC TURBOGENERATOR

Iosif Natanovich Grinbaum and Yuriy Nikolayevich Vvedenskiyk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40-41 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 14-19 (For primary document see N86-17640 08-33)

Avail: NTIS HC A03/MF A01

N86-17654# Joint Publications Research Service, Arlington, Va.
REVERSIBLE COMPONENT OF MAGNETIC INDUCTION IN MAGNETICALLY SOFT MATERIALS DURING MAGNETIZATION REVERSAL

Yuriy Nikolayevich Maslov, Oleg Nikolayevich Khmaruk, and Viktor Vasilyevich Krokhim *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 41-42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 45-50 (For primary document see N86-17640 08-33)

Avail: NTIS HC A03/MF A01

N86-17655# Joint Publications Research Service, Arlington, Va.
EQUIVALENT-CIRCUIT CALCULATIONS FOR BUILT-UP MAGNETIC STRUCTURES BY PROJECTION METHOD

Aleksandr Aleksandrovich Drozdov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 50-60 (For primary document see N86-17640 08-33)

Avail: NTIS HC A03/MF A01

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-18120# Pennsylvania State Univ., University Park.
EFFECTS OF STRONG DIFFRACTION ON THE FOCUSING AND SCATTERING OF ACOUSTIC WAVES Ph.D. Thesis

Thomas Barton Gabrielson 1985 165 p

Avail: Univ. Microfilms Order No. DA8516027

In many wave propagation problems, diffraction is considered to be a second-order effect that diffuses the sharp shadows and focal surfaces predicted by ray theory. However, if the frequency is low enough so that the wavelength is comparable to the size of the focusing region, structured fields of significant level can be found in classical shadows and smooth, featureless enhancement can replace the sharp, multiple convergences common at higher frequencies. This thesis examines the effects of strong diffraction on refractive focusing of acoustic waves. In addition, signal fluctuations caused by perturbations of the refractive index are considered where the spatial extent of a particular perturbation patch is comparable to the wavelength. In order to study these strong diffraction effects, several tools are developed: a range-dependent finite-difference solution of the time-dependent wave equation is constructed and a method based on range-dependent normal-mode theory is developed that leads to a simple interpretation of the signal fluctuations and the underlying field structure.

Dissert. Abstr.

N86-18121*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SEPARATION OF AIRBORNE AND STRUCTUREBORNE NOISE RADIATED BY PLATES CONSTRUCTED OF CONVENTIONAL AND COMPOSITE MATERIALS WITH APPLICATIONS FOR PREDICTION OF INTERIOR NOISE PATHS IN PROPELLER DRIVEN AIRCRAFT Ph.D. Thesis

Michael C. McGary Jan. 1986 313 p refs
(NASA-TM-87414; NAS 1.15:87414) Avail: NTIS HC A14/MF A01 CSCL 20A

The anticipated application of advanced turboprop propulsion systems and use of composite materials in primary structure is expected to increase the interior noise of future aircraft to unacceptability high levels. The absence of technically and economically feasible noise source-path diagnostic tools has been a primer obstacle in the development of efficient noise control treatments for propeller driven aircraft. A new diagnostic method which permits the separation and prediction of the fully coherent airborne and structureborne components of the sound radiated by plates or thin shells has been developed. Analytical and experimental studies of the proposed method were performed on plates constructed of both conventional and composite materials. The results of the study indicate that the proposed method can be applied to a variety of aircraft materials, could be used in flight, and has fewer encumbrances than the other diagnostic tools currently available. The study has also revealed that the noise radiation of vibrating plates in the low frequency regime due to combined airborne and structureborne inputs possesses a strong synergistic nature. The large influence of the interaction between the airborne and structureborne terms has been hitherto ignored by researchers of aircraft interior noise problems. Author

N86-18122# Science Applications International Corp., McLean, Va.
STOCHASTIC MEASUREMENTS AND SYSTEMS IMPLICATIONS

J. L. Collins and R. R. Greene Jun. 1985 34 p
(Contract N00014-85-C-0084)
(AD-A159827; SAIC-85/1748) Avail: NTIS HC A03/MF A01 CSCL 20/1

The U.S. Navy is defining the baseline performance of the current SSN ASW suite in the Arctic operating environment. This suite includes the AN/BQQ-5 sonar suit (including the Towed Array, the sphere and other sensor and processor sub-systems),

communications subsystems and weapon systems (Mk 48 and ADCAP). An effective acoustic measurement program in the Arctic must support the evaluation of how well the different subsystems are able to carry out their assigned functions. Unique aspects of the operating environment in the Arctic include unusual noise properties, unusual transmission effects and an unusual sea surface. This report addresses those acoustic transmission effects which affect system performance due to fluctuations or spreads in the acoustic field space, angle time and frequency. GRA

N86-18123# Woods Hole Oceanographic Institution, Mass.
AN INVERSE METHOD FOR OBTAINING THE ATTENUATION PROFILE AND SMALL VARIATIONS IN THE SOUND SPEED AND DENSITY PROFILES OF THE OCEAN BOTTOM Ph.D. Thesis
S. D. Rajan May 1985 248 p
(Contract N00014-82-C-0152)
(AD-A159848; WHOI-85-30) Avail: NTIS HC A11/MF A01 CSCL 20/1

The acoustic properties of marine sediments have a direct effect on the propagation of sound in the ocean. In the frequency range of interest (50 to 500 Hz) the sediment can be modelled as a fluid. Assuming horizontal stratification of the ocean bottom, the acoustical parameters of interests are the compressional wave speed, the compressional wave attenuation and density as a function of depth. This thesis presents an inverse method, based on a perturbation technique, determining these parameters. A monochromatic source experiment is proposed because of the desirability of such an experiment for determining the acoustic properties of an anelastic medium. The input information is the plane wave reflection coefficient as a function of the angle of incidence at a fixed frequency. A nonlinear integral equation relating the variations of these acoustic properties from a known reference value to the plane wave reflection coefficient is derived and is then linearized using the Born approximation. The region of validity of the Born approximation is derived and, based on this, the optimum angular aperture for the input data is obtained. The linearized integral equation is a Fredholm integral equation of the first kind. An acceptable stable solution of the integration is obtained with noise free data show good agreement between the true profiles and the reconstructed profiles. GRA

N86-18124# Science Applications International Corp., McLean, Va.
ARRAY POSITIONING REQUIREMENTS
J. L. Collins 26 Jun. 1985 19 p
(Contract N00014-85-C-0084)
(AD-A159866; SAIC-85/1077) Avail: NTIS HC A02/MF A01 CSCL 17/1

The measurement of acoustic signals with large, line arrays which use free suspended hydrophones, must be concerned with the location of the hydrophones, if certain array measurements are to be accurate. This report discusses location error issues and suggests a hydrophone location technique and array design to meet the test objectives and data requirements. Author (GRA)

N86-18125# Yale Univ., New Haven, Conn. Dept. of Computer Science.
AN EXPLICIT SCHEME FOR THE PREDICTION OF OCEAN ACOUSTIC PROPAGATION IN THREE DIMENSIONS
T. F. Chan, D. Lee, and L. Shen Jul. 1985 6 p
(Contracts N00014-82-K-0184; DE-AC02-81ER10996)
(AD-A160053; YALEU/DCS/RR-411) Avail: NTIS HC A02/MF A01 CSCL 20/1

Because of excessive computation time, solving the parabolic equation in higher dimensions by means of implicit finite difference schemes seems to be impracticle even if the scheme is unconditionally stable. To economize the computation time and computer storage, a stable explicit finite difference scheme is introduced for the solution of the parabolic equation of the Schroedinger type. This explicit scheme involves five spatial points and is conditionally stable by introducing and additional dissipative term. The complete theory with respect to the stability is proved. An application to a three-dimensional ocean acoustic propagation problem is included to demonstrate its validity. GRA

N86-18126# Argonne National Lab., Ill.
DEVELOPMENT OF PASSIVE ACOUSTIC IMAGING FOR LARGE HEAT TRANSFER COMPONENTS
T. N. Claytor and D. A. Greene 1985 9 p Presented at the Ultrasonics International Conference, London, England, 2 Jul. 1985 Prepared in cooperation with General Electric Co., San Jose, Calif.
(Contract W-31-109-eng-38)
(DE85-018384; CONF-850794-1) Avail: NTIS HC A02/MF A01

A passive acoustic imaging system for acoustic source location with no restriction on source character is being developed for thermal-hydraulic components. The system is particularly useful in locating continuous or quasi-continuous acoustic emission sources such as leaks in steam generators or rapid rattling of tubes in steam generators. In the imaging system to be described, acoustic signals that emanate outward from the source, through the medium, are detected by an array of low-frequency accelerometers. These time domain functions are combined with a mesh mapping algorithm to produce a spatial image showing the location and intensity of the noise source. DOE

N86-18127# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SCATTERING OF AN ACOUSTIC FIELD BY A NONHOMOGENEOUS NONUNIFORM FLOW Ph.D. Thesis - Univ. de Technologie, Compeigne, France.
Alain Guedel 1985 162 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-935)
(ONERA-P-1985-1; ISSN-0078-379X) Avail: NTIS HC A08/MF A01

The scattering of a sound field propagating through a free jet mixing layer is analyzed. For a monochromatic incident wave, the main effects are the broadening of the lane with a modulation of the wave amplitude and phase. Parametric analysis was carried out in wind tunnel experiments, and theoretically by developing models using Born and Rytov's approximations. The experimental data are compared with the predictions associated with an experimental model of the turbulence of the propagation medium. Author (ESA)

N86-18128# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
TWO METHODS FOR CALCULATING ACOUSTIC WAVE PROPAGATION THROUGH AN INTERFACE Ph.D. Thesis - Compiegne Univ.
Come Crance 1985 87 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-955)
(ONERA-NT-1985-2; ISSN-0078-3781) Avail: NTIS HC A05/MF A01

An analytical method used to compute the waves of a pulse from an infinitely far or point source, reflected and transmitted at an infinite plane separating two media of different sound velocity and density, and to compute the reflection of an acoustical pulse on a plane described as a surface of acoustic impedence is presented. The second method is numerical. It is based on a fast Fourier transform algorithm, used to solve integrals of the Sommerfeld type. The results obtained are comparable to those obtained by the stationary phase method or by geometrical acoustical approximation. Author (ESA)

N86-18129# Metraflu, Ecully (France).
ANALYSIS OF THE NOISE EMITTED BY A TAIL ROTOR Final Report [ANALYSE DU BRUIT EMIS PAR UN FENESTRON]
Michel Roger, Francette Fournier, and Paul Becker 11 Jun. 1985 102 p refs In FRENCH
(Contract DRET-83-025)
Avail: NTIS HC A06/MF A01

A two pole tail rotor noise computation method was developed, and an experimental study of diffracting effects on the turbulence generated by the rotor was carried out. The computation

predicts the noise spectra of the tail rotor. The parametric study shows that the varying properties of the incident turbulence can give different spectra. The structure design can attenuate noise by up to 20 to 30 dB. Author (ESA)

N86-18130# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
SOUND EXCITATION DURING VORTEX-AIRFOIL INTERACTION
Rainer Timm 1985 120 p refs In GERMAN; ENGLISH summary
(MPIS-Mitt-80; ISSN-0374-1257) Avail: NTIS HC A06/MF A01

Two-dimensional vortex-airfoil interaction was investigated in experiments and compared with a theoretical model. In a wind tunnel a cylinder generates a Karman vortex street and in a shock tube an asymmetric airfoil generates a starting vortex. Downstream of these vortex generators an airfoil is located. The influence of the vortices on the airfoil flow was investigated by an interferometer. Strong pressure waves originate from the leading edge of the airfoil. The order of magnitude of their amplitude and directional characteristic are experimentally determined. The experimental vortex paths can neither be correctly predicted by the developed model nor by an existing theoretical potential model. Author (ESA)

N86-18131# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Audiology Group.
APPLICATION OF ACTIVE NOISE REDUCTION FOR HEARING PROTECTION AND SPEECH INTELLIGIBILITY IMPROVEMENT
H. J. M. Steeneken and G. Langhout May 1985 23 p refs
(Contract A81/K/145)
(IZF-1985-7; TDCK-93143) Avail: NTIS HC A02/MF A01

Increase of the sound attenuation of an ear protector or a headset by the application of an Active Noise Reduction (ANR) system is discussed. As a result, the risk of hearing damage is decreased, and the quality of the communication increased. Methods to quantify these effects are described. Two ANR systems were evaluated with the measuring methods. It is found that an additional attenuation of 17 dB can be obtained at frequencies < or = 500 Hz. It is concluded that the application of ANR systems is advantageous for hearing protection and speech communication in military environments. Author (ESA)

N86-18132# Metaalcompagnie Brabant B.V., Eindhoven (Netherlands).
NOISE PREVENTION [GELUIDSWERING]
1985 45 p In DUTCH
Avail: NTIS HC A03/MF A01

Methods for noise abatement are discussed. Noise nuisance, types of noise (continuous, fluctuating, intermittent, pulsed), and types of noise abatement (absorption, vibration damping, isolation) are defined. Rockwool panels, industrial ceiling panels, baffles, acoustic foam panels, vibration dampers, acoustic mats, sandwich panels, isolating cabins and walls, ear protectors, and curtains are presented. Author (ESA)

N86-18133# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
HELICOPTER INTERNAL NOISE TREATMENT. RECENT METHODOLGIES AND PRACTICAL APPLICATIONS
H. J. Marze and F. N. Dambra 1985 15 p Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-102) Avail: NTIS HC A02/MF A01

A methodology including helicopter noise diagnosis, definition of acoustic treatment best adapted for each panel structure, and the development, tests and improvements of internal noise treatments is set up. Noise spectra are obtained at several cabin locations and helicopter speeds. An array of noise transducers placed at 120 locations allows to set the acoustic power radiated by each structure subassembly. It is shown that the method gives a good representation the wave pattern, and it may provide sufficient detail to efficiently reduce the added weight of sound proofing treatments. Author (ESA)

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-18134 National Physical Lab., Teddington (England). Beta Ray Spectrometry Sub-Group.
AN INTERCOMPARISON OF MEASUREMENTS OF THE BETA SPECTRA OF 90Sr-90Y
P. Christmas May 1985 16 p refs
(NPL-RS(EXT)77; ICRM-S-14; ISSN-0142-7135) Copyright. Avail: Issuing Activity

Three laboratories measured the beta spectra of Sr-90-Y-90 using sources prepared from a common reference solution. The results confirm that considerable care is required to obtain accurate data, and suggest that further measurements of Sr-90-Y-90 should be made. Author (ESA)

N86-18135 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
NEUTRON DOSIMETRY INTERCOMPARISON AT THE NATIONAL PHYSICS LABORATORY
V. E. Lewis Jul. 1985 61 p refs
(NPL-RS(EXT)-79; ISSN-0143-7135) Copyright. Avail: Issuing Activity

Seven groups participated in a neutron dosimetry intercomparison. They used an Exradin tissue equivalent (TE) ionization chamber plus an energy compensated Geiger-Muller (GM) counter as the neutron insensitive device. Some groups used a magnesium/argon ionization chamber as well as the GM counter. The TE ionization chamber responses are consistent within the estimated random uncertainties, thus giving good agreement for the total doses. The GM counter responses are also consistent and this, combined with low and accurately known relative neutron dose sensitivities, results in good agreement for the separate neutron and photon dose components. However, the Mg/Ar devices, although nominally of the same type, produce wide variations in response which result in very inconsistent sets of values for the dose components. This suggests that the Mg/Ar chamber is not sufficiently accurate. Author (ESA)

N86-18136 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
AN AUTOMATED CHARGE MONITORING SYSTEM FOR THE NPL LINEAR ACCELERATOR
D. T. Burns Aug. 1985 16 p refs
(NPL-RS(EXT)80; ISSN-0143-7135) Copyright. Avail: Issuing Activity

An automated charge monitoring system for a linear accelerator electron beam was assembled for use at radiation intensities associated with industrial applications. The system is based on the fast integration of current signals from a toroidal pulse transforming coil wound around the accelerator flight tube. Efforts devoted to minimizing electromagnetic pickup in the signals, to impedance matching, and to correct earthing, giving a significant reduction in the noise level, are described. The system was tested by comparison of the total charge reading with the absorbed dose measured by high dose graphite and aluminum calorimeters. A typical series of irradiations yields a standard deviation of + or - 1 % in the ratio of total charge to absorbed dose. Author (ESA)

N86-18137# Oak Ridge National Lab., Tenn.
PHENOMENOLOGY OF NEW PARTICLE PRODUCTION IN HEAVY-ION COLLISIONS
A. B. Balantekin, C. Bottcher, M. R. Strayer, and S. J. Lee 1985 9 p refs Presented at the Atomic Theory Workshop on Relativistic and QED Effects in Heavy Atoms, Gaithersburg, Md., 23 May 1985 Prepared in cooperation with Yale Univ., New Haven, Conn.
(Contracts DE-AC02-76ER03074; DE-AC05-84OR-21400)
(DE85-016372; CONF-8505189-2) Avail: NTIS HC A02/MF A01

It is shown that the existence of sharp lines in the positron emission spectra observed in low-energy heavy-ion collisions is consistent with the production and subsequent decay of a neutral,

pseudoscalar particle with a mass of about 1.6 MeV and a lifetime of about 10(-13) sec. DOE

N86-18138# California Univ., Berkeley. Lawrence Berkeley Lab.
COMPOUND NUCLEUS STUDIES WITH REVERSE KINEMATICS
L. G. Moretto Jun. 1985 18 p refs Presented at the Conference on Nuclear Structure With Heavy Ions, Legnaro, Padova, Italy, 27 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016630; LBL-19806; CONF-8505172-3) Avail: NTIS HC A02/MF A01

Reverse kinematics reactions are used to demonstrate the compound nucleus origin of intermediate mass particles at low energies and the extension of the same mechanism at higher energies. No evidence has appeared in our energy range for liquid-vapor equilibrium or cold fragmentation mechanisms. DOE

N86-18139# Los Alamos National Lab., N. Mex.
GROUP REPRESENTATION MATRIX AND SCATTERING FROM NUCLEI
J. N. Ginocchio 1985 5 p Presented at the 14th International Colloquium on Group Theoretical Methods in Physics, Seoul, Korea, 26 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017527; LA-UR-85-3094; CONF-8508117-1) Avail: NTIS HC A02/MF A01

It is shown that the transition matrix for elastic and inelastic medium energy protons scattered from nuclei described by the interacting boson model is the SU6 group representation matrix. Closed form expressions for this transition matrix are derived for the special cases of a vibrational nucleus, a (GAMMA)-unstable rotor nucleus, and an axially symmetric rotor nucleus. DOE

N86-18140# Stanford Linear Accelerator Center, Calif.
RECENT RESULTS OF THE STUDY OF PHOTON-PHOTON COLLISIONS
J. C. Sens Aug. 1985 23 p refs Presented at the 5th International Conference on Physics in Collision, Autun, France, 3 Jul. 1985
(Contract DE-AC03-76SF-00515)
(DE85-018110; SU-SLAC-PUB-3754; CONF-850785-3) Avail: NTIS HC A02/MF A01

Results are reported on the production of two- and four-hadron final states, and on the formation of the eta, eta' and f mesons in photon-photon collisions. DOE

N86-18141# Pacific Northwest Lab., Richland, Wash.
NEW DELAYED NEUTRON PRECURSORS MEASURED AT TRISTAN
P. L. Reeder, R. A. Warner, M. D. Edmiston, R. L. Gill, and A. Piotrowski Sep. 1985 7 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985 Prepared in cooperation with Bluffton Coll., Ohio and Brookhaven National Lab., Upton, N.Y.
(Contracts DE-AC02-76CH-00016; DE-AC06-76RL-01830)
(DE85-017918; PNL-SA-13117; CONF-850942-19) Avail: NTIS HC A02/MF A01

Recent development of reliable, high intensity ion sources for the TRISTAN on-line mass separator facility has greatly expanded the number of very neutron-rich fission products available. Half-lives and delayed neutron emission probabilities are being measured for these nuclides with a high efficiency neutron counter. During the past year, previously unknown P sub n values have been measured for 11 precursors: (75)Cu, (100)Rb, sup 100 to 102 Sr, sup 100 to 102 Y, (148)Ba, and (149)La. DOE

N86-18142# Oak Ridge National Lab., Tenn.
EVOLUTION OF NUCLEAR SHAPES AT HIGH SPINS
N. R. Johnson 1985 8 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018074; CONF-850942-24) Avail: NTIS HC A02/MF A01

The dynamic electric quadrupole (E2) moments are a direct reflection of the collective aspects of the nuclear wave functions. For this, Doppler-shift lifetime measurements have been done utilizing primarily the recoil-distance technique. The nuclei with neutron number N approx. 90 possess many interesting properties. These nuclei have very shallow minima in their potential energy surfaces, and thus, are very susceptible to deformation driving influences. It is the evolution of nuclear shapes as a function of spin or rotational frequency for these nuclei that has commanded much interest in the lifetime measurements discussed here. There is growing evidence that many deformed nuclei which have prolate shapes in their ground states conform to triaxial or oblate shapes at higher spins. Since the E2 matrix elements along the yrast line are sensitive indicators of deformation changes, measurements of lifetimes of these states to provide the matrix elements has become the major avenue for tracing the evolving shape of a nucleus at high spin. Of the several nuclei we have studied with N approx. 90, those to be discussed here are sup 160,161/Yb and (158)Er. In addition, the preliminary, but interesting and surprising results from our recent investigation of the N = 98 nucleus, (172)W are briefly discussed. DOE

N86-18143# Illinois Inst. of Tech., Chicago. Dept. of Physics.
HEAVY PARTICLE PRODUCTION IN HIGH ENERGY HADRON COLLISIONS
J. C. Collins, D. E. Soper, and G. Sterman 1985 38 p refs Presented at the Oregon Workshop on Super High Energy Physics, Eugene, Oreg., 18 Mar. 1985 Prepared in cooperation with Argonne National Lab., Ill., Oregon Univ., Eugene, and State Univ. of New York, Stony Brook
(Contract W-31-109-eng-38)
(DE85-018354; CONF-8503175-1) Avail: NTIS HC A03/MF A01

We consider the problem of how to compute the cross section for producing heavy strongly interacting particles (quarks, gluinos, squarks...) in high energy hadron collisions, supposing that the heavy particle masses are large compared to 1 GeV. We use heavy quark production as an example. We consider several low order graphs in the kinematic region expected to produce the bulk of the total production cross section. Based on the structure of the low order graphs, we argue that the cross section can be reliably computed in QCD by using the same factorization formula that is used for jet production and W and Z production, but inserting the appropriate parton level cross sections for the heavy particle production. We emphasize that an analysis at all orders of perturbation theory is needed to reliably establish this conjecture. DOE

N86-18144# Argonne National Lab., Ill.
MODEL FOR CHARGE STATE DISTRIBUTIONS OF HEAVY COULOMB EXPLOSION FRAGMENT IONS
P. J. Cooney, A. Faibis, E. P. Kanter, W. Koenig, D. Maor, and B. J. Zabransky 1985 26 p Presented at the 11th International Conference on Atomic Collisions in Solids, Washington, D.C., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018363; CONF-850813-3) Avail: NTIS HC A03/MF A01

We have conclusively demonstrated the systematic shift of the distributions of final charge states, for Coulomb explosion fragments compared to isotachic monatomic ion beams. This shift includes both an enhanced yield of lower charge states (below the equilibrium mean) concomitant with a decrease in the yield of charge states above the mean and thus essentially preserves the shapes of the distributions. From the trends of the data, it was shown that this shift is attributable to an enhanced electron capture probability for ions emerging from the target foil as spatially correlated diatomic clusters. A simple model was presented relating the charge state distributions measured for molecular-ion impact to the equilibrium distribution measured for the case of impact by a monatomic ion beam. This model describes the apparent nonequilibration of the molecular-ion charge state distributions as a simple consequence of electron capture cross sections dependent upon the internuclear separations of the exiting cluster fragments. Because this separation is large compared to the orbital radius of captured electrons, the enhancement of the electron

capture cross sections can be treated as a weak perturbation of the potential at the position of the electron. Such an approximation allows the estimation of this enhancement. This model, though admittedly overly simplified, resolves the long-standing problem of understanding the distributions of final charge states when heavy diatomic molecular ions exit from solids. DOE

N86-18145# Argonne National Lab., Ill.
BASIC ASPECTS OF ION BEAM MIXING
R. S. Averback Jul. 1985 41 p refs Presented at the 7th International Conference on Ion Beam Analysis, Berlin, West Germany, 7 Jul. 1985
(Contract W-31-109-eng-38)
(DE85-018391; CONF-850716-4) Avail: NTIS HC A03/MF A01

Irradiation of solids with energetic particles results in the reorganization of constituent target atoms, i.e., ion beam mixing (IM). At low temperatures, IM is characterized by prompt (10(-10)s) diffusion processes which are localized in the vicinity of the displacement cascade. Mixing at low temperatures can cause the system to depart far from the equilibrium state. At elevated temperatures, the diffusion of radiation-induced defects extends the mixing to longer times and greater distances. These delayed IM processes tend to return the system toward equilibrium. Recent experimental progress has led to a qualitative understanding of the fundamental aspects of IM in both temperature regimes. This has been achieved through systematic measurements of the influences of temperature, dose, dose-rate, cascade energy density, and chemical interactions on IM. The results of these experiments will be reviewed and compared to IM models based on collisional, thermal spike, and radiation-enhanced diffusion processes. The relation of IM to other fundamental radiation damage effects will also be discussed. DOE

N86-18146# Argonne National Lab., Ill.
NEW RESULTS ON Bhabha SCATTERING AT 29 Gv
J. S. Loos and D. E. Wood 1985 9 p refs Presented at the Meeting of the Particles and Fields Division of the American Physical Society, Eugene, Oreg., 12 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018408; CONF-850869-1; CONF-850819-6) Avail: NTIS HC A02/MF A01

New results are given on Bhabha scattering at the center-of-mass energy of 29 GeV, based on a sample having an integrated luminosity of 165 pb(-1) observed in the High Resolution Spectrometer (HRS) at the PEP colliding beam facility. The measured differential cross sections are used to evaluate Standard Model parameters, lower bound limts on QED cutoff parameters, and lower bound limits on composite model parameters. DOE

N86-18147# Argonne National Lab., Ill.
HADRON PRODUCTION IN e(+)e(-) ANNIHILATION AT RADICAL s = 29 GeV
M. Derrick, E. Fernandez, R. Fries, L. Hyman, P. Kooijman, J. S. Loos, B. Musgrave, L. E. Price, J. Schlereth, and K. Sugano 1985 38 p refs Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985 Prepared in cooperation with Indiana Univ., Bloomington, Michigan Univ., Ann Arbor, Purdue Univ., West Lafayette, Ind., California Univ., Berkeley, Lawrence Berkeley Lab., and Stanford Linear Accelerator Center, Calif.
(Contract W-31-109-eng-38)
(DE85-018410; CONF-850721-3) Avail: NTIS HC A03/MF A01

Data from the High Resolution Spectrometer at PEP have been used to study the inclusive production of baryons and mesons. Time-of-flight measurements are used to identify the charged hadrons. Neutral hadrons are identified from effective mass peaks in their decay into two charged particles. Cross sections for charged pions, charged and neutral kaons, protons and lambda hyperons are given. Other inclusive production characteristics are presented. The cross section ratios to the point cross section are: R(K(0)) = 5.59 +- 0.19 +- 0.30, and for (LAMBDA)'s, R((LAMBDA)) = 0.762 +- 0.052 +- 0.064. The results, when compared to the Lund fragmentation model, give (us/ud)/(s/d) = 0.30 +- 0.10. DOE

N86-18148# Argonne National Lab., Ill.
THE np ELASTIC-SCATTERING EXPERIMENTS WITH POLARIZED NEUTRON BEAMS
J. S. Chalmers, W. R. Ditzler, D. Hill, J. Hoftiezer, K. Johnson, T. Shima, H. Shimizu, H. Spinka, R. Stanek, and D. Underwood 1985 4 p refs Presented at the 6th International Symposium on Polarization Phenomena in Nuclear Physics, Osaka, Japan, 26 Aug. 1985 Prepared in cooperation with Texas A&M Univ., College Station, Los Alamos National Lab., N. Mex., New Mexico State Univ., Las Cruces, Montana Univ., Missoula, and Washington State Univ., Pullman
(Contract W-31-109-eng-38)
(DE85-018454; ANL-HEP-CP-85-83; CONF-850807-7) Avail: NTIS HC A02/MF A01

Measurements of the spin transfer parameters, K/sub NN/ and K/sub LL/, at 500, 650, and 800 MeV are presented for the reaction p-vector d (YIELDS) n-vector pp at 0(0). The data are useful input to the NN data base and indicate that the quasi-free charge exchange (CEX) reaction is a useful mechanism for producing neutrons with at least 40% polarization at energies as low as 500 MeV. Measurements of np elastic scattering observables C/sub LL/ and C/sub SL/ covering 35 deg to 172 deg are performed using a polarized neutron beam at 500, 650, and 800 MeV. Preliminary results are presented. DOE

N86-18149# Lawrence Livermore National Lab., Calif.
DIFFICULTIES WITH INFERRING NEUTRON CROSS SECTIONS FROM CHARGED-PARTICLE REACTIONS
D. G. Gardner and M. A. Gardner May 1985 5 p refs Presented at the International Conference on Nuclear Data for Basic and Applied Science, Santa Fe, N. Mex., 13 May 1985
(Contract W-7405-eng-48)
(DE86-000020; UCRL-91742; CONF-850507-54) Avail: NTIS HC A02/MF A01

We have investigated problems associated with inferring cross sections for neutron reactions on unstable nuclei in the mass-90 region from charged-particle reactions on nearby stable targets. We conclude that effects due to precompound evaporation, isospin, and multiple reaction paths severely limit the circumstances under which charged-particle studies may be directly and easily converted to neutron cross sections of useful accuracy. DOE

N86-18150# Stanford Linear Accelerator Center, Calif.
APPLICATIONS OF QUANTUM CHROMODYNAMICS TO HADRONIC AND NUCLEAR INTERACTIONS
S. J. Brodsky and C. R. Ji Aug. 1985 92 p Presented at the Stellenbosch Advanced Course in Theoretical Physics (Quarks and Leptons), Stellenbosch, South Africa, 21 Jan. 1985
(Contract DE-AC03-76SF-00515)
(DE86-000054; SU-SLAC-PUB-3747; CONF-850179-1) Avail: NTIS HC A05/MF A01

The application of perturbative QCD and light-cone Fock methods to the structure of hadrons and nuclei and their exclusive and inclusive interactions at short distances are reviewed. DOE

N86-18151# Texas Univ., Austin. Inst. for Fusion Studies.
DRIFT MODES WITH DIFFERENTIAL ROTATION AND PASSING ELECTRONS
J. Liu, W. Horton, and J. Sedlak Jul. 1985 54 p
(Contract DE-FG05-80ET-53088)
(DE85-017243; DOE/ET-53088/195) Avail: NTIS HC A04/MF A01

The stability of drift modes in a radially bounded cylindrical model of the tandem mirror central cell is analyzed as a function of plasma rotation and passing electron density. Analytic solutions for solid-body rotation and variable wall-to-plasma radius are used to derive formulas for the threshold and cutoff values of the passing-to-trapped electron density ratio. For certain density ratios all low m modes are unstable for all solid body rotational speeds. The effect of shear in the rotational profiles is shown to be a

significant stabilizing effect on the rotationally-driven interchange instability. For typical profiles with the rotational velocity (UC OMEGA)(r) monotonically decreasing with radius, we show that for some parameters the rotational modes are stabilized by shear well before the onset of the shear-driven instabilities. DOE

N86-18152# Lawrence Livermore National Lab., Calif.
NUCLEAR SPIN POLARIZATION OF SOLID DEUTERIUM-TRITIUM
P. C. Souers, E. M. Fearon, E. R. Mapoles, J. R. Gaines, J. D. Sater, and P. A. Fedders 1985 28 p Presented at the 32th National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985 Prepared in cooperation with Ohio State Univ., Columbus and Washington Univ., St. Louis, Mo.
(Contract W-7405-eng-48)
(DE85-017279; UCRL-92700; CONF-851174-1) Avail: NTIS HC A03/MF A01

It appears that parallel alignment of deuteron and triton magnetic moments increases the cross section of the nuclear reaction T(d,n) He(4) by 50%, thereby promising a laser driver of perhaps half the original energy. Both brute-force and dynamic nuclear polarization are considered, and the many potential problems of the latter are considered. High nuclear polarization by the dynamic technique requires a small nucleus-to-unpaired electron ratio, a long longitudinal nuclear relaxation time and a short longitudinal electron relaxation time. Normal D-T is shown to be inadequate, and enriched and possibly very pure molecular DT will be required. The key variable is the nuclear relaxation time, which can either depend on the interaction with rotationally excited impurity molecules or on paramagnetic defects formed by the tritium radiation. Radiation-induced DT decomposition and rotational catalysis will combat one another to affect the DT purity. The expected atom density and fractionation effects are considered. There exists one frequency at which both D and T atoms can be pumped. DOE

N86-18153# Brookhaven National Lab., Upton, N. Y.
QUARK DYNAMICS OF N ANTI N ANNIHILATION
C. B. Dover 1985 27 p Presented at the Symposium on Medium Energy Nucleon and Antinucleon Scattering, Bad Honnef, F.R. Germany, 18 Jun. 1985 Prepared in cooperation with Paris 11, Orsay, France
(Contract DE-AC02-76CH-00016)
(DE85-017508; BNL-36821; CONF-8506162-2) Avail: NTIS HC A03/MF A01

It is argued that recent observations of strong L dependence and approximate selection rules in certain N anti N annihilation modes necessitate a description of the reaction mechanism in terms of quark-gluon degrees of freedom. DOE

N86-18154# Brookhaven National Lab., Upton, N. Y.
LARGE MAGNETIC SPECTROMETER GROUP
S. J. Lindenbaum and L. S. Schroeder 1985 46 p Presented at the Workshop on Experiments for RHIC, Upton, N.Y., 15 Apr. 1985 Prepared in cooperation with City Coll., N.Y. and California Univ., Berkeley. Lawrence Berkeley Lab.
(Contracts DE-AC03-76SF-00098; DE-AC02-76CH-00016)
(DE85-017512; BNL-36774; CONF-8504152-8) Avail: NTIS HC A03/MF A01

This working group concentrated its efforts on possible large magnetic spectrometers for studying charged particle production in high energy nucleus-nucleus collisions at RHIC. In particular, the major efforts of the group were divided into two parts: (1) one group concentrated on a detector for tracking charged particles near mid-rapidity only, while (2) the other group considered a device for tracking particles over as much of the 4(PI) solid angle as possible. Both groups were interested in being able to detect and track as wide a range of particles (primarily hadrons) as practical, in order to isolate the possible production of a quark-gluon phase in central nucleus-nucleus collisions. DOE

N86-18155# Los Alamos National Lab., N. Mex.
ABC'S OF PION CHARGE EXCHANGE
W. R. Gibbs, W. B. Kaufmann, and P. B. Siegel 1985 20 p Presented at the Double Charge Exchange Workshop, Los Alamos, N. Mex., 10 Jan. 1985 Prepared in cooperation with Arizona State Univ., Tempe
(Contract W-7405-eng-36)
(DE85-017531; LA-UR-85-3054; CONF-850162-3) Avail: NTIS HC A02/MF A01

Calculations of pion single charge exchange using the PWIA and DWIA are presented. Emphasis is given to the effects of absorbtion and blocking. A microscopic calculation of the 0 deg. excitation and low energy angular distribution is in excellent agreement with the data. A fixed nucleon multiple scattering calculation of the pion double charge exchange reaction is presented. Various valence neutron wave functions are used, and the contributions of different spatial orientations of the last two neutrons to the reaction are examined. The DCX cross section is found to be very sensitive to the inclusion of correlations in the two-neutron wave function. Satisfactory agreement with DCX data on (14)C can be obtained using a nucleonic picture of the nucleus. DOE

N86-18156# Lawrence Livermore National Lab., Calif.
RADIOACTIVE ION BEAM RESEARCH AT LLNL
G. J. Mathews, R. W. Bauer, R. C. Haight, and K. E. Sale Aug. 1985 9 p refs Presented at the TRIUMF Accelerated Radioactive Beams Workshop, Parksvill, British Columbia, 4 Sep. 1985
(Contract W-7405-eng-48)
(DE85-018183; UCRL-93275; CONF-8509148-2) Avail: NTIS HC A02/MF A01

In this paper we discuss efforts underway at LLNL to develop the technology for the measurement of proton and alpha-particle reactions with unstable nuclei which are necessary for understanding the nucleosynthesis and energy generation in hot hydrogen-burning environments. DOE

N86-18157# Lawrence Livermore National Lab., Calif.
BRIGHTNESS MEASUREMENTS ON THE LIVERMORE HIGH BRIGHTNESS TEST STAND
G. J. Caporaso and D. L. Birx May 1985 14 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Previously announced in IAA as A85-10785
(Contract W-7405-eng-48)
(DE86-000016; UCRL-91914; CONF-850504-284) Avail: NTIS HC A02/MF A01

Two brightness measuring techniques which use small radius collimating pipes with or without axial magnetic fields are described. Their application to measure the brightness of an extracted 1-2 kA, 1-1.5 MeV electron beam is reported. The beam conditions necessary to insure the proper use of these techniques are specified. C.D.

N86-18158# Los Alamos National Lab., N. Mex.
STUDY OF OPTICAL TRANSITION RADIATION PRODUCED BY 30 TO 70 MEV ENERGY ELECTRONS: APPLICATION TO THE DIAGNOSTICS OF BEAMS WITH CHARGED PARTICLES. CHAPTER 2: DESCRIPTION OF THE EXPERIMENTAL DEVICE. CHAPTER 6: EXPERIMENTS WITH TRANSITION RADIATION INTERFERENCE Ph.D. Thesis - Paris-Sud Univ., Orsay, France, 1976
L. Wartski 1985 89 p Translation from Ph.D. Thesis, Paris-Sud Univ., Centre d'Orsay, 1976, pp 48-62, 80-116
(Contract W-7405-eng-36)
(DE86-001258; LA-tr-85-47) Avail: NTIS HC A05/MF A01

Our experimental work on transition radiation was essentially carried out on the 80 MeV electron Linear Accelerator of Saclay (AL80). A few experiments were also performed on the Linear Accelerator of Orsay and are described. To study the properties of this radiation and to explore its possible applications for the diagnosis of such relativistic particle beams, we placed the specimens to be irradiated in the electron path itself, at the output of the last accelerating section, or slightly in front of the operating space. DOE

N86-18159# Rome Univ. (Italy). Dipt. di Fisica.
NEUTRINOLESS DOUBLE BETA DECAY AND MULTIQUARK STATES IN NUCLEI
M. Lusignoli and M. G. Schepkin (Institute of Theoretical and Experimental Physics, Moscow) 21 Mar. 1985 23 p refs
(Preprint-449) Avail: NTIS HC A02/MF A01

The contribution to the nuclear matrix element of double beta decay due to the admixture of six-quark states in the nucleus is evaluated for the decay of Ca48, using MIT model six-quark bag wave functions. This contribution is dominant in the case of heavy Majorana neutrino exchange, and may also be important for a light Majorana neutrino. Author (ESA)

N86-18160# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATION OF THE DYNAMICS OF SELECTIVELY ROTATION-VIBRATIONALLY EXCITED DIFLUOROMETHYLENE Thesis [UNTERSUCHUNG DER DYNAMIK VON SELEKTIV ROVIBRONISCH ANGEREGTEM DIFLUORMETHYLEN]
A. Wilms Mar. 1985 64 p refs In GERMAN
(MPIS-5/1985; ISSN-0436-1199) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

The dynamics of vibrationally excited CF2 was investigated. Gaseous CF2 in the ground state is pumped into a vibration state by laser excitation. The induced fluorescence is spectrally and time resolved at pressures between 0.01 and 100 mbar. The laser allows a selective occupation of single rotation-vibration levels with defined rotation quantum numbers. This is shown by rotation analysis of highly resolved excitation spectra. The velocity constants of the disactivation of the selectively rotation-vibrationally excited CF2 are determined with nine different collision partners. The mechanism of the shock-induced depopulation of these rotation levels is determined with four different collision partners. Author (ESA)

N86-18161# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATION OF THE FORMATION, IONIZATION, AND COLLISION DYNAMICS OF MICROCLUSTERS USING SCATTERING ANALYSIS Thesis [UNTERSUCHUNG DER BILDUNG, IONISATION UND STOSSDYNAMIK VON MIKROCLUSTERN DURCH STREUANALYSE]
Henning Meyer Apr. 1985 158 p refs In GERMAN
(MPIS-6/1985; ISSN-0436-1199) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

A microcluster investigation method which uses the scattering kinematics of clusters of different size in a collision process with a light target particle for mass selection and the identification of neutral particles is presented. Angle and velocity dependence of scattered intensities are measured. Microclusters of argon and ammonia with helium as collision partner are investigated. The measurements on the systems Arn-He provide precise data about the fragmentation process in the ion source during the electron collision for clusters with $n < or = 6$. The density of the species in the beam is also determined as a function of source conditions, pressure, and nozzle diameter. The collision-induced dissociation of Ar2-He is demonstrated; the trajectory calculations agree with the experiment. For the more strongly bound NH3-cluster a strong fragmentation in the ion source is found. The measurements also provide information about the scattering dynamics. The method can also be used for the analysis of other cluster species, and of photoinduced predissociation of clusters. Author (ESA)

N86-18162# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATIONS OF THE INTERACTION BETWEEN Na(3P) AND K(4S) USING MEASUREMENTS OF THE DIFFERENTIAL SCATTERING CROSS SECTION Thesis [UNTERSUCHUNGEN DER WECHSELWIRKUNG VON Na(3P) MIT K(4S) DURCH MESSUNG DIFFERENTIELLER STREUQUERSCHNITTE]
Rainer Liedtke Feb. 1985 99 p refs In GERMAN
(MPIS-7/1985; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22

The interaction between the collision partners Na(3P) and 5(4S) was studied as a special case of alkali-alkali interaction in the thermal energy domain. The setup uses crossed molecular beams with, in the center, a part of the laser-excited Na-atoms; the laser light is at the same time a component of the detection system. Time-of-flight measurements following the pseudostatic method and differential cross section measurements following the digital lock-in method are performed; the scattered particles are detected by a quadropule mass filter. By varying the collision energy a broad experimental basis for the determination of the potential parameters is provided. The modified velocity selector substantially improves the bad intensity ratios. Previously determined potentials are extensively verified. Previously calculated differential cross sections do not agree with the measured structures. The complicated structure of the cubic rainbow scattering cannot unequivocally be determined. Author (ESA)

N86-18163# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
LARGE-t ELASTIC SCATTERING AND DIFFRACTION DISSOCIATION
J. Timmermans May 1985 21 p refs Presented at International Symposium on Physics of Proton-Antiproton Collision, Tsukuba, Japan, 13-15 Mar. 1985
(NIKHEF-H/85-4; B8566780) Avail: NTIS HC A02/MF A01

Collider results on proton-antiproton elastic scattering at large values of the four-momentum transfer squared are presented. The results are compared with predictions of theoretical models of high-energy collisions. Single diffraction dissociation at the collider is also discussed. Author (ESA)

N86-18164# Stockholm Univ. (Sweden). Inst. of Physics.
THE RED BAND SPECTRUM OF GASEOUS CaH. MOLECULAR EQUILIBRIUM GROUND STATE CONSTANTS. TERM VALUES OF THE A(2)PI, B(2)SIGMA, AND X(2)SIGMA STATES
L.-E. Berg, L. Klynning, and H. Martin Jun. 1985 17 p refs
(USIP-85-13) Avail: NTIS HC A02/MF A01

The wave numbers of the term values of the A, B, and X states of Ca H molecule transitions are given. Molecular equilibrium constants of the X(2)Sigma ground state are presented. Author (ESA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-18165# Fermi National Accelerator Lab., Batavia, Ill.
NEW AND OLD ACCELERATORS: WHAT CAN THEY DO FOR ASTROPHYSICS
J. D. Bjorken Jul. 1985 10 p refs Presented at the Inner Space/Outer Space Conference, Batavia, Ill., 2 May 1984
(Contract DE-AC02-76CH-03000)
(DE85-013220; FNAL/C-85-100-A; CONF-8405155-8) Avail: NTIS HC A02/MF A01

The quantum numbers and energy spectrum of high energy accelerators and storage rings are described, along with some ways they may contribute to astrophysical issues. Some emphasis is given to the role of relativistic heavy-ion colliders in possibly providing laboratory samples of quark-gluon plasma. DOE

N86-18166# Fermi National Accelerator Lab., Batavia, Ill.
LOW LEVEL RF SYSTEM FOR THE FERMILAB TEVATRON
K. Meisner, H. Edwards, J. Fitzgerald, and Q. Kerns Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-017440; FNAL-TM-1327; CONF-850504-266) Avail: NTIS HC A02/MF A01

This paper discusses the design philosophy, hardware, and operation of the Fermilab Tevatron low level rf system. Plans to extend the system for colliding beams physics are also presented. DOE

N86-18167# Fermi National Accelerator Lab., Batavia, Ill.
PROGRAMMABLE HIGH POWER BEAM DAMPER FOR THE TEVATRON
J. Crisp, R. Goodwin, R. Gerig, M. Johnson, A. Jones, C. Kerns, Q. Kerns, P. Lucas, D. Martin, and H. Miller Jun. 1985 4 p refs Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-017441; FNAL-TM-1326; CONF-850504-270) Avail: NTIS HC A02/MF A01

A bunch-by-bunch beam damper has been developed for the Fermilab Tevatron. The system reduces betatron oscillation amplitudes and incorporates some useful machine diagnostics. The device is programmable via look-up tables so the output is an arbitrary function, on a bunch-by-bunch basis, of the beam displacement. We are presently using this feature to measure the betatron tune throughout the acceleration cycle. DOE

N86-18168# Fermi National Accelerator Lab., Batavia, Ill.
PROPOSALS FOR SYNCHROTRON LIGHT SOURCES
L. C. Teng Jun. 1985 6 p refs Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-017444; FNAL-TM-1325; CONF-850504-263) Avail: NTIS HC A02/MF A01

Ever since it was first applied in the 1960's synchrotron radiation from an accelerating electron beam has been gaining popularity as a powerful tool for research and development in a wide variety of fields of science and technology. By now there are some 20 facilities operating either parasitically or dedicatedly for synchrotron radiation research in different parts of the world. In addition there are another 20 facilities either in construction or in various stages of proposal and design. The experiences gained from the operating facilities and the recent development of insertion devices such as wigglers and undulators as radiation sources led to a new set of requirements on the design of synchrotron radiation storage rings for optimum utility. The surprisingly uniform applicability and unanimous acceptance of these criteria give assurance that they are indeed valid criteria derived form mature considerations and experiences. Instead of describing the design of each of these new facilities it is, thus, more effective to discuss these desirable design features and indicate how they are incorporated in the design using machines listed as examples. DOE

N86-18169# Indiana Univ., Bloomington. Dept. of Physics.
INDIANA UNIVERSITY HIGH ENERGY PHYSICS GROUP Technical Progress Report, 1 Dec. 1984 - 30 Nov. 1985
E. D. Alyea, B. B. Brabson, R. R. Crittenden, A. R. Dzierba, R. M. Heinz, H. J. Martin, and H. O. Ogren 1985 33 p
(Contract DE-AC02-84ER-40125)
(DE85-012000; DOE/CH-40125/3) Avail: NTIS HC A03/MF A01

The Indiana University High Energy Physics Group has been performing experiments at SLAC, Fermilab, and Brookhaven during the current contract year. We have also done design work and preliminary prototyping for a magnetic monpole search under the Gran Sasso Mountain. Studies of e(+)e(-) interactions at SLAC have produced many interesting results on charm production, quark fragmentation, tau production and decay, jets, and searches for new phenomena. Data on jet and dimuon production data were collected with the Multiparticle Spectrometer at Fermilab. Brookhaven data were used to do a spin parity analysis of the E Meson (glueball candidate). DOE

N86-18170# Argonne National Lab., Ill.
STATUS OF THE INTENSE PULSED NEUTRON SOURCE
J. M. Carpenter, B. S. Brown, R. L. Kustom, G. H. Lander, C. W. Potts, A. W. Schulke, and G. Wuestefeld 1985 28 p Presented at the International Collaboration on Advanced Neutron Sources, Oxon, England, 8 Jul. 1985 Prepared in cooperation with Kernforschungsanlage Juelich, West Germany
(Contract W-31-109-eng-38)
(DE85-018387; CONF-850795-5) Avail: NTIS HC A03/MF A01

Fortunately in spite of some premature reports of its impending demise, IPNS has passed the fourth anniversary of the first delivery of protons to the targets (May 5, 1981) and is approaching the fourth anniversary of its operation as a scattering facility (August 4, 1981). On June 10, 1984, the RCS delivered its one billionth pulse to the IPNS target - the total number of protons delivered to the targets amounted then to 75 stp cc of H2 gas. Since startup IPNS has improved steadily in terms of the performance of the Rapid Cycling Synchrotron, the source and its moderators and the scattering instruments, and a substantial and productive user program has evolved. This report summarizes the current status of the Intense Pulsed Neutron Source at Argonne National Laboratory. We include reference to recent accelerator operating experience, neutron facility operating experience, improvements to these systems, design work on the ASPUN high-current facility, booster target design, the new solid methane moderator, characterization of the room temperature moderators, and provide some examples of recent results from several of the spectrometers. DOE

N86-18171# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
SYSTEMS ANALYSIS OF SOLID FUEL NUCLEAR ENGINES IN CISLUNAR SPACE
Ulrich Thomas, H. H. Koelle, R. Balzer-Sieb, D. Bernau, J. Czarnitzki, A. Floete, D. Goericke, A. Lindenthal, R. Protsch, O. Teschner et al 15 Dec. 1984 106 p refs In GERMAN; ENGLISH summary (ILR-Mitt-142) Avail: NTIS HC A06/MF A01

The use of nuclear engines in cislunar space was studied and the restrictions imposed on nuclear ferries by the chemical Earth to lower Earth orbit (LEO) transportation system were analyzed. The operating conditions are best met by tungsten-water-moderated reactors due to a high specific impulse and long durability. Specific transportation cost for LEO to geostationary orbit (GEO) and LEO to lunar orbit flights were calculated for a transportation system life of 50 yr. Average transportation costs are estimated to be 141 $/kg. No difference is made for both routes. An additional analysis of smaller and larger flight units shows only small cost reductions by employing larger ferries but a significant cost increase in case smaller flight units are used. Author (ESA)

N86-18172# Stockholm Univ. (Sweden). Inst. of Physics.
THE NA27 TRIGGER
R. Bizzarri (Rome Univ., Italy), E. DiCpua (Rome Univ., Italy), S. Falciano (Rome Univ., Italy), M. Iori (Rome Univ., Italy), G. Marel (Rome Univ., Italy), G. Piredda (Rome University), L. Zanello (Rome University), L. Haupt, S. Hellman, S. O. Holmgren et al May 1985 30 p refs
(USIP-85-10) Avail: NTIS HC A03/MF A01

A minimum bias trigger and a fiducial volume trigger were developed for an experiment in which a small rapid cycling hydrogen bubble chamber was exposed to 360 GeV/c pi(-) and 400 GeV/c proton beams. More than 3 million bubble chamber pictures were taken with a triggered cross section > 75% of the total inelastic cross section. Events containing charm particles were triggered with an efficiency of 98% + 2% - 3%. With the fiducial volume trigger, the probability for a picture to contain an interaction in the visible hydrogen increasing from 47.3% to 59.5% reducing film cost and processing effort by 20%. The improvement in data acquisition rate is shown to be negligible. Author (ESA)

N86-18173# Stockholm Univ. (Sweden). Inst. of Physics.
COMMUTATOR OF THE QUARK MASS MATRICES IN THE STANDARD ELECTROWEAK MODEL AND A MEASURE OF MAXIMAL CP-VIOLATION
C. Jarlskog Jun. 1985 15 p refs
(USIP-85-14) Avail: NTIS HC A02/MF A01

The structure of the quark mass matrices in the standard electroweak model is investigated. The commutator of the quark mass matrices is found to provide a convention independent measure of CP-violation. Maximal CP-violation is discussed. Experimental data indicate that CP is nowhere maximally violated.
Author (ESA)

N86-18174# Stockholm Univ. (Sweden). Inst. of Physics.
THE F MESON BACKGROUND AND F CANDIDATES IN 360 GeV c/Pi(-) p AND pp INTERACTIONS
C. Fisher (Science and Engineering Research Council, Chilton, England), S. O. Holmgren, K. E. Johansson, I. Moa, and S. Nilsson Jun. 1985 19 p refs
(USIP-85-15) Avail: NTIS HC A02/MF A01

The search for F meson decays in high energy hadron interactions, including misinterpreted D meson decays is reviewed. In a high resolution bubble chamber experiment, three events which give constrained kinematic fits to F decays were observed. However, other solutions are possible. Analysis difficulties in the presence of kinematic ambiguities and the absence of charged particle identification are discussed. Two of the three decays discussed are to modes where charged particle identification would not resolve D/F ambiguities. Author (ESA)

N86-18175# Stockholm Univ. (Sweden). Inst. of Physics.
TREATMENT OF STRANGE PARTICLE DECAYS OBSERVED IN THE UA5 STREAMER CHAMBERS
K. Jon-And and Ch. Walck Jul. 1985 45 p refs
(USIP-85-16) Avail: NTIS HC A03/MF A01

Decay vertex fits and momentum determination of strange particles observed in collider experiments are described. The precision of the evaluated quantities is discussed. Weighted fit methods, with constraints given by the kinematics of the decay, are shown to be advantageous compared to unweighted methods. Author (ESA)

74 OPTICS

Includes light phenomena.

N86-18176 California Univ., San Diego.
CROSSING CHANNEL WAVEGUIDE ELECTRO-OPTIC MODULATORS Ph.D. Thesis
Gary Evan Betts 1985 252 p
Avail: Univ. Microfilms Order No. DA8515589

A theoretical and experimental investigation of the integrated optical crossing channel waveguide electro-optic modulator (sometimes called a TIR modulator) is presented. This modulator basically consists of two intersecting channel waveguides (either single- or multi-mode) with an electrode pair in the intersection region. Some variations of the basic X intersection design are also studied. The dependence of performance upon various design parameters is reported. These modulators are potentially useful for several reasons, among which are: (1) they have a very simple structure; (2) multi-mode versions offer the possibility of increased linear dynamic range; (3) their short electrode length gives them a very wide bandwidth; and (4) versions with wide, multi-mode channels can improve optical power handling capability. A theoretical model based upon mode conversion during propagation through the device is used to analyze these modulators. Dissert. Abstr.

N86-18177 Rochester Univ., N. Y.
ANAMORPHIC GRADIENT INDEX LENS SYSTEMS Ph.D. Thesis
Joan Marie Stagman 1985 155 p
Avail: Univ. Microfilms Order No. DA8516488

Analytical tools and experimental techniques are developed and used to evaluate the importance of anamorphic gradient-index lens systems in optical design. A ray trace algorithm is formulated to calculate the paths of rays through anamorphic gradient-index media. The ray trace algorithm is based upon a power series expansion of the ray path and the index profile. Lenses are designed to couple light from a laser diode into a multimode optical fiber. Designs are formulated for lasers having various amounts of axial astigmatism. A twofold increase in the coupling efficiency beyond that of a butt-coupled system is achieved. Gradient-index samples having an anamorphic index profile are fabricated using the ion exchange technique. Diffusions into elliptical rods and plane slabs are performed. An ac shearing interferometer is constructed to measure the index of refraction profile of anamorphic gradient-index samples. Measurements are made of the phase variation across the sheared wavefront. The index of refraction profiles are constructed by numerical integration of the phase data.
Dissert. Abstr.

N86-18178 Rochester Univ., N. Y.
THE INTERACTION BETWEEN ELECTRIC DIPOLES AND WAVEGUIDING SURFACES AT OPTICAL FREQUENCIES Ph.D. Thesis
William Robert Holland 1985 178 p
Avail: Univ. Microfilms Order No. DA8516473

An electric dipole placed in close proximity to a surface exhibits optical properties that are very different from those of an isolated electric dipole. In the case of a conducting surface, classical theory predicts that the dipole will exhibit a resonance frequency shift, a change in its radiative decay rate, and coupling with a transverse magnetic surface wave at the metal-air interface (i.e., a surface plasmon). These effects have been observed, measured, and analyzed on a dipole/surface system which incorporates a high index dielectric layer between the dipole and the metal, thus forming a metal-acid waveguiding structure. Dissert. Abstr.

N86-18179*# Virginia Univ., Charlottesville.
INVESTIGATION OF THE QUANTUM EFFICIENCY OF OPTICAL HETERODYNE DETECTORS Final Report
T. E. Batchman Nov. 1984 44 p refs
(Grant NAG1-262)
(NASA-CR-176489; NAS 1.26:176489; UVA/528212/EE85/101)
Avail: NTIS HC A03/MF A01 CSCL 20F

The frequency response and quantum efficiency of optical photodetectors for heterodyne receivers is investigated. The measurements utilized two spectral lines from the output of two lasers as input to the photodetectors. These lines are easily measurable in power and frequency and hence serve as known inputs. By measuring the output current of the photodetector the quantum efficiency is determined as a function of frequency separation between the two input signals. An investigation of the theoretical basis and accuracy of this type of measurement relative to similar measurements utilizing risetime is undertaken. A theoretical study of the heterodyne process in photodetectors based on semiconductor physics is included so that higher bandwidth detectors may be designed. All measurements are made on commercially available detectors and manufacturers' specifications for normal photodetector operation are compared to the measured heterodyne characteristics. Author

N86-18180# Michigan Univ., Ann Arbor. Dept. of Electrical and Computer Engineering.
WHITE LIGHT OPTICAL INFORMATION PROCESSING Final Annual Report, 30 Sep. 1981 - 31 Dec. 1984
E. N. Leith 31 May 1985 110 p
(Grant AF-AFOSR-0243-81)
(AD-A160311; AFOSR-85-0853TR; AR-7) Avail: NTIS HC A06/MF A01 CSCL 20/6

Methods for optical processing and holography with light of reduced coherence are described, including the making of holographic optical elements in light of reduced spatial or temporal coherence, phase conjugation with light of reduced coherence, and Fourier transformation spatial matched filtering in spatially and temporally incoherent light. GRA

N86-18181# EG and G Energy Measurements, Inc., Las Vegas, Nev.
APPLICATIONS OF FIBER OPTIC COUPLERS TO DIAGNOSTIC EXPERIMENTS AT THE NEVADA TEST SITE

B. M. Whitcomb, V. N. Smiley, R. F. Flurer, and C. W. Colburn 1985 15 p Presented at the Conference on Fiber Optic Couplers, Connectors, and Splice Technology 2, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC08-83NV-10282)
(DE85-016787; EGG-10282-1087; CONF-8508102-1) Avail: NTIS HC A02/MF A01

Fused biconical tapered (FBT) fiber optics star couplers have been used in a variety of applications at the Nevada Test Site to provide increased signal dynamic range for recording devices. Problems which were observed resulted primarily from the modal selection processes which occur in FBT couplers. This paper describes the results of work performed to characterize a new type of splitter for the same applications. The new splitters, obtained commercially, were manufactured using reflection techniques rather than the FBT approach. The splitters exhibit virtually none of the modal problems inherent in the FBT couplers. DOE

N86-18182# Los Alamos National Lab., N. Mex.
NANOSECOND OPTICAL SHUTTERS
N. S. P. King, G. J. Yates, S. A. Jaramillo, T. S. Pagano, and J. P. Black 1985 13 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with EG and G, Inc., Goleta, Calif.; EG and G, Inc., Albuquerque, N.M.
(Contract W-7405-eng-36)
(DE85-017535; LA-UR-85-3022; CONF-850887-31) Avail: NTIS HC A02/MF A01

A comparison of gated optical shuttering responses for commercially available micro-channel plate image intensifier tubes (MCPTs) with the performance of a new design for improved optical shuttering is presented. Measurements of opacity, photocathode quantum efficiency, and shutter pulse propagation characteristics are discussed. DOE

N86-18183# Los Alamos National Lab., N. Mex.
REVIEW OF HIGH BANDWIDTH FIBER OPTICS RADIATION SENSORS
P. B. Lyons 1985 7 p refs Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017559; LA-UR-85-2863; CONF-850887-29) Avail: NTIS HC A02/MF A01

This paper summarizes the use of fiber optics or guided optical systems for radiation sensors. It is limited to passive systems wherein electrical is not required at the sensor location. However, electrically powered light sources, receivers and/or recorders may still be required for detection and data storage in sensor system operation. This paper emphasizes sensor technologies that permit high bandwidth measurements of transient radiation levels, and will also discuss several low bandwidth applications. DOE

N86-18184# Department of Energy, Washington, D. C.
OPTICAL SWITCH Patent Application
R. P. Reedy, inventor (to DOE) Filed 18 Jan. 1985 13 p Prepared in cooperation with LLNL
(Contract W-7405-eng-48)
(DE85-017783; US-Patent-Appl-SN-692760) Avail: NTIS HC A02/MF A01

An optical switching device is provided whereby light from a first glass fiber or a second glass fiber may be selectively transmitted into a third glass fiber. Each glass fiber is provided with a focusing and collimating lens system. In one mode of operation, light from the first glass fiber is reflected by a planar mirror into the third glass fiber. In another mode of operation, light from the second glass fiber passes directly into the third glass fiber. The planar mirror is attached to a rotatable table which is rotated to provide the optical switching. DOE

N86-18185# Lawrence Livermore National Lab., Calif.
SURFACE FINISH MEASUREMENTS OF DIAMOND-TURNED ELECTROLESS-NICKEL-PLATED MIRRORS
J. S. Taylor, C. K. Syn, T. T. Saito, and R. R. Donaldson 16 Aug. 1985 14 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-48)
(DE85-017833; UCRL-93245; CONF-850887-35) Avail: NTIS HC A02/MF A01

Surface roughness data are presented for a matrix of diamond-turned electroless-nickel samples having a combination of six phosphorous contents and four heat treatments. Roughness measurements were conducted with commercial optical and stylus profilometers (Wyko and Talystep). The results are discussed in terms of the material composition and heat treatment, plus other factors having an observed influence on the surface roughness. For the optimum material properties, full-length (665 (MU)m) restored 20X Wyko scans yielded values of better than 10A rms. DOE

N86-18186# Los Alamos National Lab., N. Mex.
IMAGING TECHNIQUES UTILIZING OPTICAL FIBERS AND TOMOGRAPHY
M. Wilke, N. S. P. King, N. Gray, D. Johnson, D. Esquibel, P. Nedrow, and S. Ishiwata 1985 9 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with Edgerton, Germeshausen and Grier, Inc., Los Alamos, N. Mex. and Edgerton, Germeshausen and Grier, Inc., Goleta, Calif.
(Contract W-7405-eng-36)
(DE85-017536; LA-UR-85-3021; CONF-850887-30) Avail: NTIS HC A02/MF A01

Two-dimensional, time-dependent images generated by neutrons, gamma rays, and X-rays incident on fast scintillators are relayed to streak and video cameras over optical fibers. Three dimensions, two spatial and one temporal, have been reduced to two, one in space and time utilizing sampling methods permitting reconstruction of a time-dependent, two-dimensional image subsequent to data recording. The manner in which the sampling is done optimized the ability to reconstruct the image via a maximization of entropy algorithm. This method uses four linear fiber optic arrays typically 30 meters long and up to 35 elements each. A further refinement of this technique collapses the linear array information into four single fibers by wavelength multiplexing. This permits economical transmission of the data over kilometer distances to the recording equipment. DOE

N86-18187# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Vision Research Group.
THE SMOKE TRANSMISSION AND REFLECTION THRESHOLD (START) MODEL; THE OLDEBROEK (NETHERLANDS) 2 TRIALS, MAY 1981 Final Report
J. M. Valeton Jan. 1985 31 p refs
(Contract A79/KL/151)
(IZF-1984-22; TDCK-79979) Avail: NTIS HC A03/MF A01

The contrast reduction caused by the effects of smoke and the natural atmosphere are analyzed. The minimum requirement for a smoke screen to make a target invisible is described in terms of a transmission threshold or a reflection threshold. The dependence of these thresholds on environmental parameters is described with the Smoke Transmission And Reflection Threshold model. A target is visible when the actual transmission is greater than the transmission threshold, or when the actual smoke reflection is below the reflection threshold. The transmission and reflection thresholds depend on distances in the field, inherent target contrast, visual range, and type of smoke. Prediction of the occurrence of holes, the perceptual quality of the smoke screen, and the reduction in effectiveness of weapons is discussed.
Author (ESA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-18188# Science Applications International Corp., La Jolla, Calif.
ASPECTS OF TURBULENCE IN NONLINEAR SYSTEMS, YEAR ONE Final Report, 1 Feb. - 31 Oct. 1985
E. A. Frieman and W. K. Hagan Jul. 1985 76 p
(Contract DE-AC03-84ER-13174)
(DE85-016253; SAIC-85/3070) Avail: NTIS HC A05/MF A01

Gyrokinetic theory was developed from a pragmatic point of view. Since our interest in gyrokinetic theory is to ultimately shed some light on drift wave turbulence and anomalous transport, we have tried from the outset to incorporate into our theory some of the characteristics of these phenomena as measured in experiments. This approach has led to a theory in which two time and two space scales naturally emerge. We were also led to express the full nonlinear distribution function as an equilibrium part and perturbation part, with the equilibrium being driven by the higher order interactions of the rapid fluctuations. DOE

N86-18189# Oak Ridge National Lab., Tenn.
3-D NONLINEAR MHD CALCULATIONS WITH DRIFT AND THERMAL FORCE EFFECTS
L. Garcia, H. R. Hicks, B. A. Carreras, L. A. Charlton, and J. A. Holmes Jul. 1985 30 p
(Contract DE-AC05-84OR-21400)
(DE85-018082; ORNL/TM-9499) Avail: NTIS HC A03/MF A01

A computer code (KITE) that solves a reduced set of magnetohydrodynamic (MHD) equations with diamagnetic and thermal force effects included has been constructed. It can use two different time integration schemes. A mostly-explicit time integration scheme is shown to be efficient for the nonlinear phase of tearing mode turbulence where numerical stability demands a small timestep. However, for linear calculations, or nonlinear ones in which the level of turbulence is low, a mostly-implicit approach is seen to be more efficient. The two numerical schemes yield the same solutions. Nonlinear MHD calculations in which the solutions are represented by a finite Fourier series allow one to study the dependence of the nonlinear solution on its permitted harmonic content. It is seen that for the three-dimensional (3-D), nonlinear, tearing mode disruption problem, the refinement of the solution by the addition of more modes leads to further destabilization. This contrasts to the rippling mode problem, in which the addition of modes is stabilizing. For the latter, a finite number of modes yields a converged solution that is a saturated state. This contrasting behavior reflects the basic physical mechanism of the nonlinear interaction in each case and not the particular numerical scheme used for the calculations. DOE

N86-18190# Oak Ridge National Lab., Tenn.
STOCHASTIC MODEL OF A FIRST-ORDER NONEQUILIBRIUM PHASE TRANSITION IN A MAGNETIC FUSION DEVICE
D. E. Hastings Aug. 1985 22 p
(Contract DE-AC05-84OR-21400)
(DE85-018139; ORNL/TM-9605) Avail: NTIS HC A02/MF A01

The ambipolar electric field in many nonaxisymmetric fusion devices is known to be a multivalued function. A master equation for the probability distribution of the electric field is developed for internal fluctuations, and a generalized Gibbs free energy is defined. As with a liquid-gas phase transition, the most probable value of the electric field is the one that minimizes the free energy. DOE

N86-18191# California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH TEMPERATURE EXPERIMENT FOR ACCELERATOR INERTIAL FUSION
E. P. Lee May 1985 6 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016553; LBL-19602; CONF-850504-260) Avail: NTIS HC A02/MF A01

The High Temperature Experiment (HTE) is intended to produce temperatures of 50 to 100 eV in solid density targets driven by heavy ion beams from a multiple beam induction linac. The fundamental variables (particle species, energy, number of beamlets, current and pulse length) must be fixed to achieve the temperature at minimum cost, subject to criteria of technical feasibility and relevance to the development of a Fusion Driver. The conceptual design begins with an assumed (radiation-limited) target temperature and uses limitations due to particle range, beamlet perveance, and target disassembly to bound the allowable values of mass number (A) and energy (E). An accelerator model is then applied to determine the minimum length accelerator, which is a guide to total cost. The accelerator model takes into account limits on transportable charge, maximum gradient, core mass per linear meter, and head-to-tail momentum variation within a pulse. DOE

N86-18192# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
AXISYMMETRIC TANDEM MIRROR STABILIZED BY A MAGNETIC LIMITER
J. Kesner, R. S. Post, and B. Lane Jun. 1985 21 p Presented at the Tandem Mirror Reactor Concepts, Livermore, Calif., 22 Aug. 1985
(Contract DE-AC02-78ET-51013)
(DE85-017349; DOE/ET-51013/154; PFC/CP-85-5; CONF-8508121-1) Avail: NTIS HC A02/MF A01

In order to stabilize MHD-like, fast growing $m = 1$ fluctuations in the central cell of a tandem mirror we propose the introduction of a magnetic limiter. The magnetic limiter would create a ring null in the magnetic field. Electrons which enter the null can stream azimuthally and thereby short-circuit $m = 1$ fluctuations. Some pressure could be maintained on the separatrix flux surface by locating the null on a local magnetic maxima or by axial plugging. This scheme introduces the possibility of a fully axisymmetric tandem mirror. DOE

N86-18193# Georgia Inst. of Tech., Atlanta. Fusion Research Center.
ANALYSIS OF THE UNBALANCED NBI ROTATION EXPERIMENTS IN THE ISX-B, PLT AND PDX TOKAMAKS
W. M. Stacey, Jr., C. M. Ryu, and M. A. Malik Jul. 1985 25 p
(Contract DE-AS05-78ET-52025)
(DE85-017616; GTFR-59) Avail: NTIS HC A02/MF A01

The recently developed Stacey-Sigmar theory for toroidal momentum confinement, which is based upon neoclassical gyroviscosity, has been applied to the analysis of the unbalanced NBI rotation experiments in ISX-B, PLT and PDX. Measured steady-state rotation velocities, momentum confinement times inferred therefrom and momentum confinement times inferred from rotation decay after termination of NBI were compared with theoretical predictions. Good agreement between theory and experiment was obtained over a wide range of the parameters which enter the theory (R,Z,T,B). DOE

N86-18194# Sandia National Labs., Albuquerque, N. Mex.
NEON GAS PUFF Z-PINCH IMPLOSIONS ON PROTO-2
R. B. Spielman, R. J. Dukart, B. A. Hammel, D. L. Hanson, and M. A. Palmer 1985 8 p Presented at the 4th International Workshop on Plasma Focus Research, Warsaw, Poland, 9 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017636; SAND-85-1210C; CONF-850986-1) Avail: NTIS HC A02/MF A01

We have imploded annular neon gas puff Z-pinches on the 10 TW, 0.125 (UC OMEGA) Proto-2 accelerator. Proto-2 delivers a voltage pulse with a 50 ns FWHM to the 8.5 nH single-disk vacuum feed. Currents up to 4 MA were delivered to the load. We will describe the implosion and stagnation properties of the neon plasma. Time-resolved and time-integrated X-ray pinhole photographs and time-integrated spectra will be presented. DOE

N86-18195# Sandia National Labs., Albuquerque, N. Mex.
THERMAL SHOCK BEHAVIOR OF BERYLLIUM LIMITERS IN TOKAMAK FUSION DEVICES
R. D. Watson and J. B. Whitley Aug. 1985 7 p Presented at the 8th International Conference on Structural Mechanics in Reactor Technology, Brussels, Belgium, 19 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017815; SAND-84-1578C; CONF-850809-79) Avail: NTIS HC A02/MF A01

Thermal fatigue tests were performed on prototype beryllium limiter tiles for the JET tokamak using a 30 kW, 1 amp rastered electron beam system. A heat flux of 250 W/cm(2) was applied for 15 seconds to a tile 9.5 cm x 6.35 cm x 1 cm for a total of 10,000 cycles. The only damage to the tile was the formation of thermal fatigue microcracks on the heated surface. The depth of microcracking corresponds closely to the region of cyclic plasticity that was predicted by elastic-plastic finite elements stress analyses. The surface cracking did not cause gross structural failure; hence, the beryllium limiters in JET are expected to survive operation at 250 W/cm(2) for at least 10,000 plasma discharges. DOE

N86-18196# Texas Univ., Austin. Fusion Research Center.
ANTENNA ANALYSIS AND BOUNDARY CONDITIONS FOR ALFVEN WAVE STUDIES IN TOKAMAKS
D. W. Ross, Y. M. Li, S. M. Mahajan, and R. B. Michie Jul. 1985 21 p
(Contracts DE-AC05-78ET-53043; DE-AC05-76ET-53036; DE-AS05-85ER-53193)
(DE85-018011; DOE/ET-53193/1-274; FRCR-274) Avail: NTIS HC A02/MF A01

Previous studies of Alfven wave heating which employed kinetic theory are extended to take into account antenna configurations, in cylindrical geometry, consisting of arbitrary shell currents and their associated radial feeders. For each Fourier component of the form esp-i(l zeta - m theta), the shell current consists of a divergence-free part having the helicity of the mode (l,m), plus an orthogonal part requiring the feeders. It is shown, both analytically and by including the full current in the numerical code, that only the divergence-free part of the current contributes significantly to the plasma response and antenna loading. The important effect of the feeders is to cancel the contribution from the surface current perpendicular to the helicity. This explicitly verifies results reported previously. DOE

N86-18197# Maryland Univ., College Park. Lab. for Plasma and Fusion Energy Studies.
MARYLAND CONTROLLED FUSION RESEARCH PROGRAM. VOLUME 1
1985 71 p
(Contract DE-AC05-84ER-53170)
(DE85-018027; DOE/ER-53170/T2) Avail: NTIS HC A04/MF A01

This renewal proposal describes the University of Maryland research program on Magnetic Fusion Energy for a three-year period beginning January 1, 1986. This program consists of five tasks: (1) Plasma Theory; (2) Electron Cyclotron Emission Diagnostics for Mirror Machines; (3) Electron Cyclotron Emission Diagnostics on TFTR; (4) Atomic Physics; and (5) Magnetic Field Measurement by Ion Beams. The four separate tasks of continuing research (Tasks 1 to 4) and the new experimental task (Task 5) are described in detail. The task descriptions contain estimated budgets for CY 86, 87, and 88. DOE

N86-18198# Oak Ridge National Lab., Tenn.
NE-213-SCINTILLATOR-BASED NEUTRON DETECTION SYSTEM FOR DIAGNOSTIC MEASUREMENTS OF ENERGY SPECTRA FOR NEUTRONS HAVING ENERGIES GREATER THAN OR EQUAL TO 0.8 MeV CREATED DURING PLASMA OPERATIONS AT THE PRINCETON TOKAMAK FUSION TEST REACTOR
J. K. Dickens, N. W. Hill, F. S. Hou, J. W. McConnell, R. R. Spencer, and F. Y. Tsang Aug. 1985 82 p
(Contract DE-AC05-84OR-21400)
(DE85-018079; ORNL/TM-9561) Avail: NTIS HC A05/MF A01

A system for making diagnostic measurements of the energy spectra of greater than or equal to 0.8-MeV neutrons produced during plasma operations of the Princeton Tokamak Fusion Test Reactor (TFTR) has been fabricated and tested and is presently in operation in the TFTR Test Cell Basement. The system consists of two separate detectors, each made up of cells containing liquid NE-213 scintillator attached permanently to RCA-8850 photomultiplier tubes. Pulses obtained from each photomultiplier system are amplified and electronically analyzed to identify and separate those pulses due to neutron-induced events in the detector from those due to photon-induced events in the detector. Signals from each detector are routed to two separate Analog-to-Digital Converters, and the resulting digitized information, representing: (1) the raw neutron-spectrum data; and (2) the raw photon-spectrum data, are transmited to the CICADA data-acquisition computer system of the TFTR. Software programs have been installed on the CICADA system to analyze the raw data to provide moderate-resolution recreations of the energy spectrum of the neutron and photon fluences incident on the detector during the operation of the TFTR. A complete description of, as well as the operation of, the hardware and software is given in this report. DOE

N86-18199# Auburn Univ., Ala. Dept. of Physics.
EXPERIMENTAL STUDIES OF RADIO FREQUENCY WAVES AND CONFINEMENT IN THE AUBURN TORSATRON Progress Report
D. G. Swanson 15 Aug. 1985 73 p
(Contract DE-FG05-85ER-53192)
(DE85-017189; DOE/ER-53192/1) Avail: NTIS HC A04/MF A01

The first year of operation of the Auburn Torsatron has resulted in the majority of the basic operating systems becoming operational or nearly operational. The diagnostic systems now include two microwave interferometers, a monochrometer, several probes and photodiodes. The plasma is produced by any of three sources: electron cyclotron heating with a CW power of 1 kW, low frequency RF heating with power soon to come up to 10 kW CW, and a pulsed washer-stack gun. The magnetic field studies have mapped the field surfaces and several corrections have been made to center the plasma. The ion-cyclotron source and antenna are nearly ready for experiments to begin. DOE

N86-18200# GA Technologies, Inc., San Diego, Calif.
SIMULTANEOUS MEASUREMENT OF CURRENT AND PLASMA DENSITY PROFILES IN THE TEXT TOKAMAK
D. M. Thomas, W. P. West, and S. B. Zheng Aug. 1985 9 p Presented at the 2nd International Symposium on Laser Aided Plasma Diagnostics, Culham, England, 10 Sep. 1985 Prepared in cooperation with Texas Univ., Austin
(Contract DE-AC03-84ER-53158)
(DE85-017679; GA-A-18122; CONF-8509127-3) Avail: NTIS HC A02/MF A01

A method of obtaining information on the current density profile j(r) and relative plasma density n(r) in a tokamak is discussed. Both measurements rely on analysis of the fluorescence emitted by a high energy neutral lithium beam as it traverses the plasma. Superimposed on the neutral beam trajectory is a linearly polarized dye laser beam tuned to the Doppler-shifted (PI) component of the Zeeman-split resonance line. Thus the light emitted by the beam consists of laser-induced fluorescence as well as collisionally induced fluorescence. As the Zeeman components are polarized relative to the local magnetic field direction, rotation of the plane of polarization of the laser at frequency (LC OMEGA) will modulate the laser induced fluorescence at 2(LC OMEGA), since the resonance condition is satisfied for the (PI) components twice each cycle. Phase analysis of the modulated fluorescence relative to a reference phase taken from the laser polarization direction permits us to accurately measure the local magnetic field direction at various radial positions inside the plasma. The poloidal magnetic field structure, and hence the plasma current distribution, may be deduced from the direction of the magnetic field (equal to the direction of laser polarization at maximum fluorescence) and the known magnitude of the toroidal magnetic field. Similarly, the

relative plasma density at various r may be determined from a study of the collisionally induced fluorescence signal. DOE

N86-18201# Texas Univ., Austin. Inst. for Fusion Studies.
TWO AND THREE DIMENSIONAL PARTICLE SIMULATION MODELS FOR STUDY OF PLASMA MICROINSTABILITIES
R. D. Sydora, J. N. Leboeuf, and T. Tajima Sep. 1985 19 p
(Contract DE-FG05-80ET-53088)
(DE86-000238; DOE/ET-53088/206; IFSR-206) Avail: NTIS HC A02/MF A01

Two and three dimensional particle simulation models suitable for the study of low frequency instabilities in inhomogeneous magnetized plasmas are described. Using the guiding center approximation for electrons transverse to the magnetic field and exact electron dynamics parallel, as well as full ion dynamics, the necessary physics is included to study a class of microinstabilities known as drift waves (the universal mode). Applications of the model to studies of drift wave stability in sheared fields with single and multiple rational surfaces are discussed. DOE

N86-18202# Texas Univ., Austin. Inst. for Fusion Studies.
THREE DIMENSIONAL TOROIDAL MAGNETOHYDRODYNAMIC PARTICLE CODE
F. Brunel, J. N. Leboeuf, D. P. Stotler, H. L. Berk, and S. M. Mahajan Sep. 1985 16 p
(Contract DE-FG05-80ET-53088)
(DE86-000239; DOE/ET-53088/207; IFSR-207) Avail: NTIS HC A02/MF A01

The magnetohydrodynamic particle code has been developed to three dimensions in a cylindrical coordinate system in order to describe the plasma in a torus. To keep the noise level down, the finite differences are defined halfway between grid points and the magentic force is defined in a non-conservative manner. Two practical examples of using such a code for physics applications are reported: simulations of high amplitude Global Alfven Eigenmodes and stabilization of flute modes by a hot electron ring. DOE

N86-18203# Uppsala Ionospheric Observatory (Sweden).
[ACTIVITIES REPORT IN GEOPHYSICS] Annual Report, 1984
1985 45 p refs
(UIO-SR-85-01; ISSN-0349-2699) Avail: NTIS HC A03/MF A01

Research in space plasma physics, in particular high latitude ionospheric phenomena and phenomena related to the interaction of the ionosphere with the magnetosphere and with the neutral atmosphere is summarized. In situ experiments using sounding rockets and the Swedish Viking satellite are described. Ground-based, remote sensing experiments using radar and radio techniques, in particular EISCAT, backscatter radars, and equipment for observing stimulated electromagnetic emissions from heating experiments are outlined. Routine monitoring of ionospheric conditions was performed using ionosonde, riometer, and backscatter radar techniques. Author (ESA)

N86-18204# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
A DIFFERENCE PROCEDURE TO SOLVE QUASILINEAR PLASMA PHYSICS PARABOLIC SYSTEMS [UEBER DIFFERENZENVERFAHREN ZUR LOESUNG QUASILINEARER PARABOLISCHER SYSTEME AUS DER PLASMAPHYSIK]
Karl Graf Finck vonFinckenstein Apr. 1985 29 p refs In GERMAN
(Preprint-892) Avail: NTIS HC A03/MF A01

The convergence of a nonlinear difference procedure for quasilinear parabolic initial boundary value problems in cylindrical symmetry was investigated. Consistency considerations show that the linearizations are identical with a Newton iteration. The inverse difference operators can be estimated in such a way that linear difference equations are obtained for the errors, which substantially facilitates the convergence demonstration. The convergence of semidiscrete and discrete approximate solutions is treated. A numerical example shows that the application of two and three Newton iterations allows a substantially higher time interval and hence leads to a substantial computer time saving compared with linearization. Author (ESA)

N86-18205# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
CHANNEL DESIGN FOR CLOSED CYCLE MHD
G. K. Troost (FDO Engineering Consultants, Amsterdam), C. A. L. Kemper (FDO Engineering Consultants, Amsterdam), T. W. Verbruggen (FDO Engineering Consultants, Amsterdam), R. F. vanderWijngaart, J. P. F. Lindhout, and R. K. vanderDraai 14 May 1984 22 p refs Presented at 22 Symposium on Engineering Aspects of Magnetohydrodynamics, Starkville, Miss., Jun. 1984 Sponsored in part by Netherlands Bureau for Energy Research Projects
(NLR-MP-84053-U; B8569030; FDO-TPV-84-014) Avail: NTIS HC A02/MF A01

System design studies for medium scale power plants with a closed cycle MHD topping were performed. The studies show a potential for early commercialization of the direct energy conversion technology for coal and natural gas fired utility installations. As a first step towards the large scale application of MHD, this technology can demonstrate an economically high enthalpy extraction on an intermediate scale. The closed cycle MHD power train, particularly the generator, was studied and a basic design configuration was defined. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-18206 California Univ., Irvine.
THEORETICAL INVESTIGATIONS OF METAL SURFACES Ph.D. Thesis
Dave Arthur Campbell 1985 218 p
Avail: Univ. Microfilms Order No. DA8516543

Detailed numerical results for the energy of interaction between a static charge and a jellium surface and for the total energy of interation between two static charges placed in the surface region are presented. In the latter case some novel results were obtained showing the disappearance of the bulk oscillatory behavior in the total interaction energy as the two charges are brought from inside the metal surface and placed outside the jellium edge. Both response calculations are performed by first computing the static electron density response function in the random-phase approximation. The response function for non-interaction electrons is obtained on the basis of a computational method that renders the eigenfunctions psi sub nu (x) of the Kohn-Sham equations of a jellium slab in semi-analytical form. This method consists of expanding the dependence of psi bus nu (x) on the coordinate normal to the jellium surfaces in a sine series and solving a nonlinear matrix version of the Kohn-Sham self-consistent problem. Dissert. Abstr.

N86-18207 Pennsylvania State Univ., University Park.
COMPOSITIONAL VARIATION IN THE NEAR SURFACE LAYERS: AN ATOM PROBE STUDY OF SURFACE SEGREGATION IN ALLOYS Ph.D. Thesis
Matlub Ahmad 1985 81 p
Avail: Univ. Microfilms Order No. DA8515992

Layer by layer equilibrium composition depth profiles have been obtained for one Pt-Ir and five Pt-Rh alloys using the atom probe field ion microscope. A statistical reliable amount of data was taken and the depth profiles have true single atomic layer spatial in-depth resolution. All of the depth profiles obtained are for the (001) plane. Pt was found to segregate to the top two layers in Pt-Ir alloy and Rh segregates to the to top layer in Pt-Rh alloys after annealing at 700 deg C for 5 minutes. A diffusion kinetic effect has been observed for the Pt-Ir case from which diffusion parameters have been estimated. In both cases questions regarding sufficient thermodynamic equilibrium have been resolved with

proper testing. An additional feature of impurity segregation has been observed. A minute amount of sulfur in the bulk can aggregate to the surface and form an overlayer. Such overlayer coverage has been found to vary between 0.22 to 0.52 monolayer and this coverage increases with increasing surface Rh concentration. For each of the two different alloy systems a different nature of composition variation is observed in the near surface layer. In the Pt-Ir case the Pt concentration decays to the bulk value monotonically over two atomic layers. In the Pt-Rh case significant Rh depletion is observed in the second layer and the Rh concentration returns to the bulk value from the third layer on. Dissert. Abstr.

N86-18208 Royal Signals and Radar Establishment, Malvern (England).
ULTRA-FAST PHOTOCONDUCTIVE SWITCHES
R. J. Manning and J. R. Hill Nov. 1984 34 p refs
(RSRE-Memo-3784; BR94557) Avail: NTIS HC A03/MF A01

Photoconductive switches with sampling capabilities with an undeconvolved resolution of 15 psec were developed. Since the circuit response of the gaps is known, the ultimate resolution is determined by the photoconductive decay time of the carriers, which can be as low as 3 psec. Sampling speeds are limited by the circuit response. Improvements in circuit geometry, in particular the use of coplanar waveguide structures, should enhance the direct resolution significantly. The second limitation is the finite pulse duration of the laser. Shorter pulses (< 500 fsec) would improve the development of gating speeds between 1 and 3 psec. There does seem to be a limit to the implantation dose beyond which the switch characteristics change drastically. Author (ESA)

N86-18209# Royal Signals and Radar Establishment, Malvern (England).
NONLINEAR REFRACTIVE INDEX MEASUREMENTS OF ISOTROPIC LIQUID CRYSTALS
A. M. Scott, P. A. Madden, and F. C. Saunders May 1985 32 p refs
(AD-A159519; RSRE-MEMO-3770; BR96521) Avail: NTIS HC A03/MF A01

The nonlinear refractive index of liquid crystalline materials in the isotropic phase was measured. The materials show strong enhancement of the nonlinearity due to nematic like local ordering, and even materials which do not have a nematic-isotropic transition show this enhancement. Mixtures of liquid crystals and solvents also have an enhanced nonlinearity due to local ordering. Absorption of the laser beam causes expansion which reduces the refractive index and can counteract the refractive index change due to reorientation. Author (ESA)

N86-18210# Georgia Inst. of Tech., Atlanta. School of Physics.
CORRELATION AND COLLECTIVE MODES IN NARROW BAND MATERIALS Final Report, 1 Oct. 1984 - 30 Sep. 1985
M. W. Ribarsky 2 May 1985 25 p
(Grant AF-AFOSR-0023-80)
(AD-A160310; AFOSR-85-0879TR) Avail: NTIS HC A02/MF A01 CSCL 20/3

Correlation and collective modes have been studied for systems with quite localized valence or conductance bands. In particular this research has been concerned with localized electron-hole states and how they contribute with other excitations to the dynamical response of the system. Important aspects studied have been the effects of exciton or exciton-like states on superconducting properties, electron energy loss spectra and optical spectra. Initially the system studied has been CuCl for which a tight-binding model was used. The results show that strong effects due to localized excitations of d-band electrons greatly affect the dynamical response and the effective electron interaction. Off-diagonal matrix elements of the inverse dielecttric citation spectrum, producing exciton resonances in the band gap. The exciton resonance in the dynamical response is necessary to obtain the appropriate attractive effective electron interaction for superconductivity. Models have also been set up to relate the dynamical response including local field effects to the superconducting transition temperature and gap function. The strong localization effects also will affect the loss spectra and optical spectra. GRA

N86-18211# North Carolina Univ., Chapel Hill. Dept. of Physics and Astronomy.
CATASTROPHIC PLANAR DECHANNELING IN STRAINED-LAYER SUPERLATTICES
W. K. Chu, W. R. Allen, J. A. Ellison, and S. T. Picraux 1985 20 p refs Prepared in cooperation with New Mexico Univ., Albuquerque and Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE85-017160; SAND-85-0618C) Avail: NTIS HC A02/MF A01

Recently a catastrophic dechanneling effect has been discovered to occur when the wavelength of a planar-channeled ion beam matches the layer period of a strained-layer superlattice (SLS). We report continuum model calculations of planar channeled trajectories in strained-layer superlattices to obtain the depth dependence of the dechanneling due to the SLS structure for various incident angles. The calculations are in good agreement with the dechanneling measurements. In addition, features of the dechanneling versus depth calculation are found to be quite sensitive to the continuum potential near the planes and these features are experimentally resolvable. This work not only provides for the measurement of lattice strain in superlattices, but also enhances our understanding of planar channeling and suggests a new method for comparing the accuracy of various scattering potentials. DOE

N86-18212# Pacific Northwest Lab., Richland, Wash.
HEAVY ION INDUCED DAMAGE AND DISORDER IN INTERMETALLIC COMPOUNDS WITH THE B2 STRUCTURE
J. L. Brimhall and H. E. Kissinger Nov. 1984 9 p Presented at the Symposium on High Temperature Intermetallic Compounds, Boston, Mass., 26 Nov. 1984
(Contract DE-AC06-76RL-01830)
(DE85-006881; PNL-SA-12388; CONF-8411198-1) Avail: NTIS HC A02/MF A01

Although the B2-type intermetallic compounds, NiAl, FeAl, NiTi and FeTi all maintained a high degree of order during irradiation, metastable phase formation was observed. Dislocation loops and network developed in NiAl and FeAl during irradiation and a nickel rich, fcc phase, most likely disordered Ni3Al, formed in NiAl after high doses. The build-up of constitutional vacancies (excess vacancies on Ni sites) and subsequent elemental partitioning of Ni and Al can explain the formation of a nickel rich phase in NiAl. No metastable phases formed in FeAl. Dislocation loop structures did not develop in NiTi or FeTi, rather a transformation to an amorphous phase occurred at relatively low doses. The amorphous transformation results when the free energy of the crystal lattice containing a high defect concentration exceeds the free energy of the amorphous configuration. DOE

N86-18213# Brookhaven National Lab., Upton, N. Y.
FIRST ORDER PHASE TRANSFORMATIONS: SCALING RELATIONS FOR GRAIN SELF-CORRELATION FUNCTIONS
J. D. Axe, S. M. Shapiro, Y. Yamada, and N. Hamaya Jun. 1985 7 p refs Presented at the NATO Advanced Studies Conference on Scaling Phenomena in Disordered Systems, Geilo, Norway, 10 Apr. 1985 Prepared in cooperation with Osaka Univ., Toyonaka, Japan
(Contract DE-AC02-76CH-00016)
(DE85-017509; BNL-36704; CONF-8504153-2) Avail: NTIS HC A02/MF A01

At high pressure many alkali halides transform from the NaCl (B1) structure to the CsCl (B2) structure. We have recently studied this transformation in polycrystalline RbI, which transforms at a critical pressure, P sub c = 3.5 kbar. By observing the time development of the neutron diffraction pattern after sudden increase of hydrostatic pressure from P<P sub c to P>P sub c we directly deduced X(t), the fraction of the sample converted from metastable to stable phase, as a function of time. We showed that X(t) taken at different P could be approximately scaled onto a universal growth curve by introducing an adjustable characteristic

time tau(P) for each curve. The success of the Kolmogorov in fitting X(t) suggests that comparisons of model predictions with other experimental observables be made on the system. For example, by a trivial (in principle) extension of the neutron diffraction techniques described above, one might determine the broadening of the powder diffraction peaks due to finite grain size as a function of time throughout growth. This particle size broadening is related by Fourier transformation to the grain autocorrelation function, G sub s (r,t), which measures the ensemble average of the overlap of grains with themselves upon translation of the grain pattern by an amount r. We present some results of a study of the scaling properties of G sub s (r,t) for the Kolmogorov model for d=1 and d=2. Although the model is highly idealized, it is perhaps the simplest conceivable one which obeys correlation function scaling in early stages of growth and undergoes nontrivial saturation due to volume fraction effects in the late stages. DOE

N86-18214# Los Alamos National Lab., N. Mex.
QUANTUM RESONANCES IN PHYSICAL TUNNELING
M. M. Nieto and D. R. Truax 1985 11 p refs Presented at the Dynamics of Wave Packets in Molecular and Nuclear Physics, Consendonck, Belgium, 2 Jul. 1985 Prepared in cooperation with Copenhagen Univ., Denmark
(Contract W-7405-eng-36)
(DE85-017558; LA-UR-85-2881; CONF-850789-1) Avail: NTIS HC A02/MF A01

It has recently been emphasized that the probability of quantum tunneling is a critical function of the shape of the potential. Applying this observation to physical systems, we point out that in principal information on potential surfaces can be obtained by studying tunneling rates. This is especially true in cases where only spectral data are known, since many potentials yield the same spectrum. DOE

N86-18215# Department of Energy, Washington, D. C.
METHOD OF SYNTHESIZING AND GROWING COPPER-INDIUM-DISELENIDE (CuInSe2) CRYSTALS Patent Application
T. F. Ciszek, inventor (to DOE) Filed 29 Nov. 1984 20 p
(Contract DE-AC02-83CH-10093)
(DE85-017729; US-Patent-Appl-SN-676343) Avail: NTIS HC A02/MF A01

A process for preparing CuInSe2 crystals is described which involves includes melting a sufficient quantity of B2O2 along with stochiometric quantities of Cu, In, and Se in a crucible in a high-pressure atmosphere of inert gas to encapsulate the CuInSe2 melt and confine the Se to the crucible. Additional Se in the range of 1.8 to 2.2% over the stochiometric quantity is preferred to make up for small amounts of Se lost in the process. The melt can then be cooled slowly to form the crystal as direct solidification, or the crystal can be grown by inserting a seed crystal through the B2O3 encapsulate into contact with the CuInSe2 melt and withdrawing the seed upwardly to grow the crystal thereon from the melt. DOE

N86-18216# Department of Energy, Washington, D. C.
PROCESS FOR SELECTIVELY PATTERNING EPITAXIAL FILM GROWTH ON A SEMICONDUCTOR SUBSTRATE Patent Application
P. Sheldon and R. E. Hayes, inventors (to DOE) Filed Dec. 1984 18 p
(Contract DE-AC02-83CH-10093)
(DE85-017733; US-Patent-Appl-SN-678202) Avail: NTIS HC A02/MF A01

Disclosed is a process for selectively patterning epitaxial film growth on a semiconductor substrate. The process includes forming a masking member on the surface of the substrate, the masking member having at least two layers including a first layer disposed on the substrate and the second layer covering the first layer. A window is then opened in a selected portion of the second layer by removing that portion to expose the first layer thereunder. The first layer is then subjected to an etchant introduced through the window to dissolve the first layer a sufficient amount to expose the substrate surface directly beneath the window, the first layer being adapted to preferentially dissolve at a substantially greater rate than the second layer so as to create an overhanging ledge portion with the second layer by undercutting the edges thereof adjacent the window. The epitaxial film is then deposited on the exposed substrate surface directly beneath the window. Finally, an etchant is introduced through the window to dissolve the remainder of the first layer so as to lift-off the second layer and materials deposited thereon to fully expose the balance of the substrate surface. DOE

N86-18217# Department of Energy, Washington, D. C.
IMPROVED METHOD OF PREPARING p-i-n JUNCTIONS IN AMORPHOUS SILICON SEMICONDUCTORS Patent Application
A. Madan, inventor (to DOE) Filed 10 Dec. 1984 24 p
(Contract DE-AC02-83CH-10093)
(DE85-017736; US-Patent-Appl-SN-679842) Avail: NTIS HC A02/MF A01

A method of preparing p(+)-i-n(+) junctions for amorphous silicon semiconductors includes depositing amorphous silicon on a thin layer of trivalent material, such as aluminum, indium, or gallium at a temperature in the range of 200C to 250C. At this temperature, the layer of trivalent material diffuses into the amorphous silicon to form a graded p(+)-i junction. A layer of n-type doped material is then deposited onto the intrinsic amorphous silicon layer in a conventional manner to finish forming the p(+)-i-n(+) junction. DOE

N86-18218# Department of Energy, Washington, D. C.
NARROW BAND GAP AMORPHOUS SILICON SEMICONDUCTORS Patent Application
A. Madan (Midwest Research Inst., Golden, Colo.) and A. H. Mahan, inventors (to DOE) (Midwest Research Inst., Golden, Colo.) Filed 10 Jan. 1985 9 p
(Contract DE-AC02-83CH-10093)
(DE85-017753; US-Patent-Appl-SN-690218) Avail: NTIS HC A02/MF A01

Disclosed is a narrow band gap amorphous silicon semiconductor comprising an alloy of amorphous silicon and a band gap narrowing element selected from the group consisting of Sn, Ge, and Pb, with an electron donor dopant selected from the group consisting of P, As, Sb, Bi and N. The process for producing the narrow band gap amorphous silicon semiconductor comprises the steps of forming an alloy comprising amorphous silicon and at least one of the aforesaid band gap narrowing elements in amount sufficient to narrow the band gap of the silicon semiconductor alloy below that of amorphous silicon, and also utilizing sufficient amounts of the aforesaid electron donor dopant to maintain the amorphous silicon alloy as an n-type semiconductor. DOE

N86-18219# Department of Energy, Washington, D. C.
REACTOR DESIGN FOR UNIFORM CHEMICAL VAPOR DEPOSITION-GROWN FILMS WITHOUT SUBSTRATE ROTATION Patent Application
M. Wanlass, inventor (to DOE) Filed 19 Feb. 1985 19 p Prepared in cooperation with Midwest Research Inst.
(Contract DE-AC02-83CH-10093)
(DE85-017804; US-Patent-Appl-SN-702692) Avail: NTIS HC A02/MF A01

A quartz reactor vessel for growth of uniform semiconductor films includes a vertical, cylindrical reaction chamber in which a substrate-supporting pedestal provides a horizontal substrate-supporting surface spaced on its perimeter from the chamber wall. A cylindrical confinement chamber of smaller diameter is disposed coaxially above the reaction chamber and receives reaction gas injected at a tangent to the inside chamber wall, forming a helical gas stream that descends into the reaction chamber. In the reaction chamber, the edge of the substrate-supporting pedestal is a separation point for the helical flow, diverting part of the flow over the horizontal surface of the substrate in an inwardly spiraling vortex. DOE

N86-18220# Los Alamos National Lab., N. Mex.
RELAXATION-TIME SPECTRUM FOR A HYDROGEN RELAXATION PEAK IN A Nb-50-AT. %-V ALLOY
J. R. Cost, C. L. Snead, Jr., and J. Bethin 1985 5 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation in Solids, Urbana, Ill., 3 Jun. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(DE85-017836; BNL-36858; CONF-8506125-9) Avail: NTIS HC A02/MF A01

Internal friction has been measured vs temperature from 15 to 350(0)K for equiatomic Nb-V alloys with up to 28 at. % H. A broad peak at roughly 125 K shows characteristics which strongly suggest that it is a reorientation peak. Detailed analysis using a newly developed method indicates the activation energy spectrum to be bell shaped and to be over the range 0.10 to 0.30 eV. A pre-exponential factor of 5 x 10(-13) is determined. DOE

N86-18221# Sandia National Labs., Albuquerque, N. Mex.
GaAs/In/SUB 0.25/Ga/SUB 0.75As/GaAs, MODULATION-DOPED, SINGLE, STRAINED QUANTUM-WELL FET
T. E. Zipperian and T. J. Drummond 1985 16 p Presented at the 12th International Symposium on Gallium Arsenide and Related Compounds, Karuizawa, Japan, 23 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018272; SAND-85-1068C; CONF-8509164-1) Avail: NTIS HC A02/MF A01

A new field-effect transistor structure utilizing a thin (8 nm) strained layer of In/sub 0.25/Ga/sub 0.75/As, modulation-doped above and below by Si-doped GaAs cladding layers, is described. The 1.8% bulk lattice mismatch between the In/sub 0.25/Ga/sub 0.75/As and GaAs is totally accommodated by coherent layer strain within the quantum well, without the generation of misfit dislocations. At room temperature and in the dark, the prototype device with a 2.9 micrometers gate length displayed a maximum, normalized, extrinsic transconductance of 92 mS/mm (V/sub DS/ = 1V). If device performance scales linearly with gate length to 1 micron, as do Al/sub x/Ga/sub 1-x/As/GaAs, single-interface MODFETs, this is the best room temperature performance reported to date for an In/sub x/Ga/sub 1-x/As channel, modulation-doped transistor. The transconductance of the device also proved to be almost constant with gate voltage, varying less than 13% over a 0.5V range at 77K. This is a direct result of the use of a thin quantum well as the conducting channel and implies that field-effect transistors with improved linearity at high current levels may now be fabricated. DOE

N86-18222# Argonne National Lab., Ill.
STRUCTURE OF HIGH-PRESSURE KNO3-4
T. G. Worlton, D. L. Decker, J. D. Jorgensen, and R. Kleb Jul. 1985 13 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018361; CONF-850871-11) Avail: NTIS HC A02/MF A01

Potassium nitrate has seven polymorphs in the pressure range to 40 kbar. The structures of the three phases obtainable at atmospheric pressure are known. Attempts to solve the structure of high pressure KNO3 phase 4 by X-ray diffraction have been unsuccessful. We have now solved this structure using time-of-flight neutron powder diffraction data taken at room temperature and 3.6 kbar on the SEPD at IPNS. High pressure KNO3-4 has the same space group and point group symmetry as the low pressure KNO3-2, but with different values for lattice parameters and atomic positions. The structure of KNO3-4 is orthorhombic Pnma with a = 7.4867(2), b = 5.5648(2), and c = 6.7629(2) with four formula units per unit cell. The K, N, and one O atom are in special positions (4c) and the other O atoms are in the general position (8d) just as in the atmospheric pressure phase. The O-N-O bond angles are 120.4(1) deg, and 119.3(2) deg. The N-O bond lengths are 1.228(3)A and 1.246(2)A. DOE

N86-18223# Argonne National Lab., Ill.
STRUCTURAL PHASE TRANSITION IN CeCu6
M. L. Vrtis, J. D. Jorgensen, and D. G. Hinks Aug. 1985 12 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Northwestern Univ., Evanston, Ill.
(Contract W-31-109-eng-38)
(DE85-018362; CONF-850871-10) Avail: NTIS HC A02/MF A01

The structure of CeCu6 has been studied at eight temperatures from 10K to 295K by time-of-flight neutron powder diffraction. The high temperature orthorhombic cell transforms to a monoclinic cell at 230K. Rietveld structural refinements at each temperature give details of the structural distortion associated with the transition. The space groups and the temperature dependence of the monoclinic strain are consistent with a second order transition driven by a soft acoustic phonon mode. However, small atom displacements perpendicular to the shear direction suggest that an optic mode may also be involved in the transition. DOE

N86-18224# Argonne National Lab., Ill.
NEW EXAMPLE OF SUPERCONDUCTING WALLS IN THE FERROMAGNET ErRh4B4
J. L. Genicon, J. P. Modondanon, R. Tournier, E. D. Dahlberg, and D. G. Hinks Jul. 1985 12 p refs Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Centre National de la Recherche Scientifique, Grenoble, France
(Contract W-31-109-eng-38)
(DE85-018398; CONF-850890-17) Avail: NTIS HC A02/MF A01

In the ferromagnetic state of ErRh4B4, a zero resistance is observed in the easy magnetization direction and a normal state resistance in the hard direction. These properties are characteristic of domain wall superconductivity. DOE

N86-18225# Argonne National Lab., Ill.
SYSTEMATIC VIEW OF OPTICAL ABSORPTION SPECTRA IN THE ACTINIDE SERIES
W. T. Carnall 1985 29 p refs Presented at the ACTINIDES '85, Aix-en-Provence, France, 1 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018406; CONF-8509147-8) Avail: NTIS HC A03/MF A01

In recent years sufficient new spectra of actinides in their numerous valence states have been measured to encourage a broader scale analysis effort than was attempted in the past. Theoretical modelling in terms of effective operators has also undergone development. Well established electronic structure parameters for the trivalent actinides are being used as a basis for estimating parameters in other valence states and relationships to atomic spectra are being extended. Recent contributions to our understanding of the spectra of 4+ actinides have been particularly revealing and supportive of a developing general effort to progress beyond a preoccupation with modelling structure to consideration of the much broader area of structure-bonding relationships. We summarize here both the developments in modelling electronic structure and the interpretation of apparent trends in bonding. DOE

N86-18226# Argonne National Lab., Ill.
FRACTAL BEHAVIOR OF ISOSETS AND TRAILS IN SUPERIONIC CONDUCTORS
P. Vashishta, I. Ebbsjoe, R. K. Kalia, and S. W. DeLeeuw Aug. 1985 5 p Presented at the 5th International Conference on Solid-State Ionics, Lake Tahoe, Calif., 18 Aug. 1985 Prepared in cooperation with Michigan State Univ., East Lansing
(Contract W-31-109-eng-38)
(DE85-018409; CONF-850870-4) Avail: NTIS HC A02/MF A01

Molecular dynamics simulations of ionic motion in Ag2S reveal fractal aspects of trails and isosets of Brownian motion. For silver ions in the superionic state, and silver and sulfur ions in the molten phase, fractal dimensionalities of isosets and trails are found to be anti D = 0.5 and D = 2, respectively. These results are consistent with anti D = 1 D(-1). DOE

N86-18227# Texas Univ., Austin.
POLAR FLUIDS: PHOTOEMISSION AND ELECTRONIC ENERGY

LEVELS Final Technical Report
Dec. 1984 12 p refs
(Contract DE-AS05-81ER-10890)
(DE85-016974; DOE/ER-10890/T1) Avail: NTIS HC A02/MF A01

We have measured the photoyield in pure ammonia using a pulsed technique. We have measured it as a function of bias, temperature, and photon energy, in order to study the density of electron states in NH3 and the photo-injection process into the ammonia. The photoyield versus reference potential shows a much greater range of response than previous CW techniques. We have observed a strong temperature dependence in the yield and a two slope behavior in the yield, observations which are consistent with our idea that there is a significant tail of localized states just below the conduction band in polar fluids. We have found a systematic variation in the decay mode of the injected current as a function of reference potential, temperature, and impurity concentration giving us a new tool with which to examine the photo-injection process. DOE

N86-18228# Syracuse Univ., N. Y.
CATALYTIC REACTIVITY OF THIN CRYSTAL SURFACES Progress Report
R. W. Vook and J. A. Schwarz Sep. 1985 11 p
(Contract DE-FG02-84ER-45139)
(DE85-018293; DOE/ER-45139/2) Avail: NTIS HC A02/MF A01

Our thin films appear to show lower uptake and a weaker bonding for O2 and CO adsorbates. One explanation can be postulated based on earlier reports of the interactions of these gases with bulk Pd, both single crystals and polycrystalline foils. The work of White and co-workers showed that oxygen adsorption behavior on new, polycrystalline Pd foils was significantly different from that of used foils, although both were judged clean by AES. They observed that the O2 adsorption rate on a new surface was slow, but after a long O2 exposure above 800 K, the amount increased; and they suggested that oxygen can be incorporated below the surface, thus modifying the activity of the surface metal atoms. They further postulated that differences of O2 adsorption phenomena on Pd surfaces may be caused by surface reconstruction during repeated heating cycles or by surface impurities which cannot be detected by AES. More recently Spicer and co-workers (1983) have confirmed these earlier suppositions. Our smooth-flat films appear to have few surface defects which allow gas incorporation in and/or below the surface. This feature might be responsible for their observed adsorptive properties and is likely also to be reflected in their catalytic properties. DOE

N86-18229# Argonne National Lab., Ill.
TRICRITICAL BEHAVIOR IN THE FERROMAGNETIC SUPERCONDUCTOR ErRh4B4
G. W. Crabtree, R. K. Kalia, D. G. Hinks, F. Behroozi, and M. Tachiki Aug. 1985 11 p Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018339; CONF-850890-16) Avail: NTIS HC A02/MF A01

A new tricritical point on the phase boundary between the superconducting vortex phase and the normal paramagnetic phase of ErRh4B4 is presented. The microscopic origin of the tricritical point and the expected tricritical behavior are briefly discussed. DOE

N86-18230# Argonne National Lab., Ill.
INELASTIC SCATTERING FROM AMORPHOUS SOLIDS
D. L. Price Aug. 1985 20 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018371; CONF-850871-16) Avail: NTIS HC A02/MF A01

The potential of inelastic neutron scattering techniques for surveying various aspects of the dynamics of amorphous solids is briefly reviewed. The recent use of the Intense Pulsed Neutron Source to provide detailed information on the optical vibrations of glasses is discussed in more detail. The density of states represents an averaged quantity which gives information about the general characteristics of the structure and bonding. More extensive information can be obtained by studying the detailed wavevector dependence of the dynamic structure factor. DOE

N86-18231# Argonne National Lab., Ill.
DISORDER AND TRANSPORT IN LITHIUM/ALUMINUM
J. D. Jorgensen, S. Susman, T. O. Brun, K. J. Volin, J. Faber, Jr., and R. DeJus Aug. 1985 9 p refs Presented at the 5th International Conference on Solid-state Ionics, Lake Tahoe, Calif., 18 Aug. 1985 Prepared in cooperation with Studsvik Science Research Lab., Nykoeping, Sweden
(Contract W-31-109-eng-38)
(DE85-018389; CONF-850870-3) Avail: NTIS HC A02/MF A01

Neutron powder diffraction measurements on (BETA)-LiAl have proven that the defects formed at high temperature are reciprocal pairs of antisite defects, Li/sub Al/ and Al/sub Li/. These reciprocal pairs are generated over the entire (BETA)-phase domain. The formation of the antisites is not due to an order-disorder transformation. The relation between the antisite defects and Li diffusion cannot be established directly from the present experiments. DOE

N86-18232# Argonne National Lab., Ill.
RHOMBOHEDRAL-TO-TRICLINIC PHASE TRANSITION IN BaMo6S8
J. D. Jorgensen and D. G. Hinks Jul. 1985 12 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018450; CONF-850871-14) Avail: NTIS HC A02/MF A01

The rhombohedral, R3 bar, to triclinic, P1 bar, transition in BaMo6S8 at 175K has been studied by neutron powder diffraction. The first order nature of the transition, as required by Landau theory, is suggested by the temperature dependence of the triclinic distortion; however, no volume discontinuity can be seen with the precision of this measurement. The triclinic structure is characterized by a distortion of the Mo6 octahedra and a shear of the axial sulfur atoms which allows the Ba ion to localize at the origin position. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-18233 Ruhr Univ., Bochum (West Germany). Inst. fuer Mechanik.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF A THERMOPLASTIC CONSTITUTIVE LAW Thesis [THEORETISCHE UND EXPERIMENTELLE UNTERSUCHUNGEN ZU EINEM THERMO-PLASTISCHEN STOFFGESETZ]
Uwe Zdebel Dec. 1984 161 p refs In GERMAN; ENGLISH summary
(RUB-IFM-MITT-43) Copyright. Avail: Issuing Activity

A thermoplastic constitutive law allowing combinations of isotropic and kinematic hardening as well as deviations from the normality rule was examined. Since the energy balance for thermomechanical processes is taken into account, the consistent connection to thermodynamic laws is guaranteed. The experimental verification of material parameters is described; it is performed by isothermal tension-torsion tests on thin-walled tubes at different temperatures. The materials functions allow the extension to nonisothermal (adiabatic) processes. The comparison between theoretical and exprimental results is not entirely satisfactory and demonstrates the remaining inconsistencies. Suggestions which could lead to a better description of the behavior of elastoplastic materials are made. Author (ESA)

N86-18234# Oak Ridge National Lab., Tenn.
THERMODYNAMIC PROPERTIES AND MICROSCOPIC STRUCTURE OF FLUIDS AND FLUID MIXTURES
E. Johnson 1985 15 p refs Presented at the 12th Annual Meeting of the National Organization of Black Chemists and Chemical Engineers, Minneapolis, Minn., 22 May 1985
(Contract DE-AC05-84OR-21400)
(DE85-016482; CONF-8505193-1) Avail: NTIS HC A02/MF A01

A closed set of exact equations is used to determine the pair distribution function and critical temperature of a number of lattice fluids. Since the equations used are closed and exact, in principle results which are as accurate as desired may be obtained. Most methods of statistical mechanics for treating fluids are based on approximate equations, so the accuracy of results obtained from them are limited. DOE

N86-18235# Colorado State Univ., Fort Collins. Dept. of Physics.
ABSOLUTE WAVELENGTH MEASUREMENT AND FINE STRUCTURE DETERMINATION IN (7)Li 2
E. Riis, H. G. Berry, O. Poulsen, S. A. Lee, and S. Y. Tang 1985 3 p refs Presented at the 7th International Conference on Laser Spectroscopy, Maui, Hawaii, 24 Jun. 1985 Prepared in cooperation with Aarhus Univ., Denmark
(Contract W-31-109-eng-38)
(DE85-018382; CONF-850605-5) Avail: NTIS HC A02/MF A01

The energy levels of two-electron atoms continue to provide rigorous tests of relativistic quantum theory, and of correlation effects within a multi-particle system. These interactions are determined perturbatively, with several approximations, and theoretical results often differ. It is critical to provide precise measurements of absolute wavelengths connecting these atomic energy levels to obtain a resolution of the precision of the different parts of such complex calculations. In this work, we report high precision optical measurements in the 1s2s (3)S - 1s2p (3)P multiplet of Li 2 using fast-beam laser spectroscopy. A collinear interaction using both parallel and antiparallel laser and ion beams allows both for precise elimination of large Doppler shifts, and for a strong kinematic narrowing of the observed resonances, as compared with thermal beam experiments. The wavelengths of the observed resonance fluorescence radiation are determined by comparing them with simultaneously recorded saturated absorption profiles of molecular iodine hyperfine components. In turn, the absolute wavelengths of the iodine lines are obtained from precisely calibrated Fabry-Perot etalon fringes in a separate experiment. The final precision of the Li 2 wavelengths is 5 parts in 10(9), which is at a level of precision of 80 ppM of the QED corrections in the transition. DOE

N86-18236# Sandia National Labs., Livermore, Calif.
MAXIMUM PERFORMANCE OF SOLAR HEAT ENGINES: DISCUSSION OF THERMODYNAMIC AVAILABILITY AND OTHER SECOND LAW CONSIDERATIONS AND THEIR IMPLICATIONS
R. F. Boehm Sep. 1985 23 p
(Contract DE-AC04-76DR-00789)
(DE85-018550; SAND-85-8229) Avail: NTIS HC A02/MF A01

A review of thermodynamic principles is given in an effort to see if these concepts may indicate possibilities for improvements in solar central receiver power plants. Aspects related to rate limitations in cycles, thermodynamic availability of solar radiation, and sink temperature considerations are noted. It appears that considerably higher instantaneous plant efficiencies are possible by raising the maximum temperature and lowering the minimum temperature of the cycles. Of course, many practical engineering problems will have to be solved to realize the promised benefits. DOE

N86-18237# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
GRAVITATIONAL COUNTERTERMS IN AN AXIAL GAUGE
T. Matsuki Jun. 1985 30 p
(Contract DE-AS05-77ER-05490)
(DE86-001329; DOE/ER-05490/66) Avail: NTIS HC A03/MF A01

All the counterterms of quantum Einstein gravity are calculated up to bilinear terms and one-loop order in an axial gauge as a sum of gauge-invariant and the Becchi-Rouet-Stora-invariant terms. Contrary to the de Donder gauge condition, ten out of thirty-three coefficients for counterterms remain undetermined in this gauge. Some relations among the counterterms, which satisfy the BRS invariance, are implicitly obtained in the course of the calculations. DOE

N86-18238# California Univ., Santa Barbara. Inst. for Theoretical Physics.
MARKOV TREE MODEL OF TRANSPORT IN AREA PRESERVING MAPS
J. D. Meiss and E. Ott Sep. 1985 34 p
(Contract DE-FG05-80ET-53088)
(DE86-000237; DOE/ET-53088/204; IFSR-204) Avail: NTIS HC A03/MF A01

Transport in an area preserving map with a mixture of regular and chaotic regions is described in terms of the flux through invariant cantor sets called cantori. A model retaining a discrete set of cantori approaching a boundary circle gives the Markov chain description of Hanson, Cary and Meiss. The inclusion of cantori surrounding island chains, and islands about islands, etc. gives a Markov tree model with a slower decay rate. The survival probability distribution is shown to decay asymptotically as a power law. The decay exponent agrees well with the computations of Karney and Chirikov and Shepelyanski. DOE

N86-18239# Rome Univ. (Italy). Dipt. di Fisica.
ULTRAVIOLET PROBLEM AND ANALYTICAL PROPERTIES OF CLASSICAL FIELD THEORIES
Roberto Livi (Florence University), Marco Pettini (Osservatorio Astrofisico di Arcetri, Florence), Stefano Ruffo (Florence University), and Angelo Vulpiani 25 Mar. 1985 24 p refs
(Preprint-451) Avail: NTIS HC A02/MF A01

The absence of ergodicity is investigated analytically and numerically for classical field theories and for Euler equations in two dimensions. In the latter case the arguments of Patrascioiu (1984) are extended to the inviscid two-dimensional fluid dynamical case. The risks of truncation introduced by a numerical simulation of continuous systems reflecting on the analytical properties of the solution of the field equation are discussed. It appears that ergodicity is a property only of the discretized problem. Results are tested on a simple model of a radiant cavity, which shows the absence of the ultraviolet catastrophe and the possibility of wrong interpretations of numerical simulations of field theory. Author (ESA)

N86-18240# Rome Univ. (Italy). Dipt. di Fisica.
TOWARDS A NONPOTENTIAL SCATTERING THEORY
R. Mignani 16 Apr. 1985 69 p refs
(Preprint-454) Avail: NTIS HC A04/MF A01

A formal approach to nonpotential scattering theory based on the generalization of the concept of scattering matrix to the Lie-isotopic and Lie-admissible case is presented. In the time-dependent formalism, the main task is the determination of the evolution operator, from which the S-matrix is found as a double infinite limit. In the time-independent approach, the isotopic Schroinger eigenvalue equation is solved by exploiting the properties of isotopic Green's operators, Lippmann-Schwinger equations and incoming and outgoing states, which are suitable generalizations of the conventional ones. The changes in cross sections due to nonpotential forces are explicitly worked out for simple cases. A purely algebraic approach to nonpotential scattering, based on the properties of the isowave operators, is presented. The Lie-admissible formulation of the main results is outlined. Author (ESA)

N86-18241# Rome Univ. (Italy). Dipt. di Fisica.
ON THE STOCHASTIC QUANTIZATION OF FIELD THEORY
G. Jona-Lasinio and P. K. Mitter (Paris University) 16 Apr. 1985 55 p refs Sponsored by CNR

(Preprint-457; LPTHE-84/36) Avail: NTIS HC A04/MF A01

A rigorous construction of a stochastic continuum P(Phi)2 model in finite Euclidean space-time volume is obtained by a weak solution of a nonlinear stochastic differential equation in a space of distributions. The resulting Markov process has continuous sample paths, and is ergodic with the finite volume Euclidean P(Phi)2 measure as its unique invariant measure. The procedure may be called stochastic field quantization. Author (ESA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-18242# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors.
METHODS FOR DESIGNING SOFTWARE TO FIT HUMAN NEEDS AND CAPABILITIES. PROCEEDINGS OF THE WORKSHOP ON SOFTWARE HUMAN FACTORS
N. S. Anderson and J. R. Olson May 1985 46 p Workshop held in Washington, D.C., Jun. 1983
(Grant N00014-85-G-0093)
(AD-A156647) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Committee on Human Factors of the Commission on Behavioral and Social Sciences and Education sponsored jointly by the Air Force Office of Scientific Research, the Army Research Institute for the Behavioral and Social Sciences, the Office of Naval Research, the National Aeronautics and Space Administration, and the National Science Foundation reports on software and human factors. The term software human factors refers to the process of designing software to be effective for human use, i.e., easy to learn and use, productive, and efficient. However, no specific efforts have been made to operationally define the objectives of software factors. The Workshop on Software Human Factors was convened in June 1983 in Washington, D.C. The workshop had three goals: to identify current methods used to design and evaluate human factors aspects of software, including overall design and methods for collecting on user performance; to ascertain what we know from software research results that we did not know 10 years ago; and to identify new research methods that are needed, both to develop design principles for software and to discover how users understand software systems. Author

N86-18243# National Aerospace Lab., Amsterdam (Netherlands).
[PERSONNEL ACTIVITIES REPORT IN AEROSPACE RESEARCH] Annual Report, 1984 [SOCIAAL JAARVERSLAG 1984]
1984 56 p In DUTCH Original contains color illustrations
Avail: NTIS HC A04/MF A01

The social aspects of NLR aerospace research are described. Author (ESA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-18244# Department of Energy, Oak Ridge, Tenn.
ENERGY DATA BASE: INTRODUCTION TO CONTENT AND STRUCTURE, REVISION 1
Sep. 1985 25 p
(DE84-017165; DOE/TIC-4608-Rev-1) Avail: NTIS HC A02/MF A01

Contents of this booklet are: introduction, history, compilation of the EDB, subject coverage, types of documents included, special collections in the EDB, data elements, indexing practices, additional documentation about the EDB, and current awareness publications compiled from the EDB. DOE

N86-18245# Lawrence Livermore National Lab., Calif.
BIBLIOGRAPHIC POST-PROCESSING WITH THE TIS INTELLIGENT GATEWAY: ANALYTICAL AND COMMUNICATION CAPABILITIES
H. D. Burton Sep. 1985 90 p
(Contract W-7405-eng-48)
(DE85-018153; UCID-20529) Avail: NTIS HC A05/MF A01

This report demonstrates the capabilities of the process functions of the TIS Intelligent Gateway. These functions support bibliometric analysis of a wide range of commercial and federal databases. Examples are provided of search output from five online search systems. Each set of citations was translated to a common format and then analyzed and reformatted using process. DOE

N86-18246# Oak Ridge National Lab., Tenn.
INFORMATION SYSTEMS DEVELOPMENT AIDS
M. L. Emrich and R. Bryant Aug. 1985 117 p
(Contract DE-AC05-84OR-21400)
(DE85-018161; ORNL/TM-9647) Avail: NTIS HC A06/MF A01

Information engineers use a variety of techniques, procedures and methodologies to specify, design, program, test, and maintain Information Systems. Various automated tools are available for assisting the information engineer in this work. This document seeks to provide a general overview of the development life-cycle process and of tools available for assisting in that process. DOE

N86-18247# Argonne National Lab., Ill.
DATABASES AND AUTOMATED REASONING
E. L. Lusk and R. A. Overbeek 1985 8 p Presented at the International Topical Meeting on Computer Applications for Nuclear Power Plant Operation and Control, Pasco, Wash., 8 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018348; CONF-850903-17) Avail: NTIS HC A02/MF A01

The design of application systems incorporating automated reasoning technology requires an understanding of database design, familiarity with various types of automated reasoning methods, and an integrated view of the database and reasoning system. We describe here the relationship, based on the common language of first-order logic, between entity-relationship database design techniques and automated reasoning systems. We include a brief overview of logic programming, automated theorem proving, and production-rule systems as separate but related branches of automated reasoning. DOE

N86-18248# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Informatique.
PROPOSITIONS TO IMPLEMENT A COMPUTERIZED PRIVATE DOCUMENT RETRIEVAL SYSTEM. PRESENTATION OF THE PERSONALIZED DOCUMENTATION AID TOOL (OPAD) Ph.D. Thesis [PROPOSITIONS POUR L'ELABORATION DE SYSTEMES D'ASSISTANCE A LA DOCUMENTATION PERSONNELLE. PRESENTATION D'OUTIL PERSONNALISE

D'ASSISTANCE A LA DOCUMENTATION (OPAD)]
Benoit Pinta 27 Feb. 1985 259 p refs In FRENCH
(ENST-85E001; ISSN-0751-1353) Avail: NTIS HC A12/MF A01

The needs of research scientists were investigated in order to propose computerized assistance to their private documentation management. Indexing and data acquisition for this case are examined. The elaboration of a computer program, as well as all the elements composing a personalized documentation system are described. Author (ESA)

N86-18249# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
PUBLICATIONS, CATALOG 1985
1985 27 p refs In FRENCH; ENGLISH summary
Avail: NTIS HC A03/MF A01

Documents published by ONERA since it was created in 1976 are listed. Subjects include aerodynamics, fluid mechanics, flight mechanics, aerothermodynamics, propulsion, combustion, communications, navigation, instrumentation, structural analysis, aeroelasticity, acoustics, laser, plasmas, environment, computer sciences, materials, solid state physics, and astronautics.
Author (ESA)

N86-18250# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
FILMS, CATALOG 1985
1985 28 p In ENGLISH and FRENCH
Avail: NTIS HC A03/MF A01

An ONERA catalog of scientific films is presented. Films on aerodynamics, large wind tunnels, water tunnels, propulsion, structures, materials, rockets, missiles and space research are listed. Author (ESA)

N86-18251# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/Algorithms and Architecture.
A DISTRIBUTED FILE SERVICE BASED ON OPTIMISTIC CONCURRENCY CONTROL
Sape J. Mullender (Vrije Univ., Netherlands) and Andrew S. Tanenbaum Apr. 1985 23 p refs
(CWI-CS-R8507; B8567090) Avail: NTIS HC A02/MF A01

Principles for a distributed file and data base system that leaves a large degree of freedom to users are presented. It can be used as an efficient storage medium for files, but also as a basis for a distributed data base system. An optimistic concurrency control mechanism, based on the simultaneous existence of several versions of a file or data base is used. Each version gives clients a consistent view of the contents of the file at the time of the version's creation. How this mechanism works, how it can be implemented and how serializability of concurrent access is enforced are shown. A garbage collector that runs independent of, and in parallel with the operation of the system is presented.
Author (ESA)

N86-18252# National Aerospace Lab., Amsterdam (Netherlands). Informatics and Fluid Dynamics Div.
ENGINEERING DATA INTERACTIVE PRESENTATION AND ANALYSIS SYSTEM (EDIPAS): A GENERAL APPROACH TO ENGINEERING DATA MANAGEMENT AND ANALYSIS APPLIED TO WIND TUNNEL TESTING
R. K. vanderDraai and F. J. Heerema 8 Sep. 1983 41 p refs Submitted for publication
(NLR-MP-83057-U; B8566269) Avail: NTIS HC A03/MF A01

Utilizing database management and interactive graphics techniques, the Engineering Data Interactive Presentation and Analysis System (EDIPAS) was designed and implemented for aircraft development. Data management facilities are provided in EDIPAS to cope with the data transfer problem. Basic facilities to tailor analysis and presentation functions to the needs of various disciplines are available. Examples of application of EDIPAS for experiments in wind tunnels are given. Author (ESA)

N86-18253# Syracuse Univ., N. Y. School of Information Studies.
STUDY OF FREE-INDEX PHRASES Final Report
J. Katzer, R. N. Oddy, and P. Das-Gupta Jun. 1985 93 p
(Grant NSF IST-82-11348)
(PB85-240117; NSF/IST-85001) Avail: NTIS HC A05/MF A01 CSCL 05B

Results are presented of research undertaken to identify the defining characteristics of free-index phrases, to develop an algorithm to produce surrogate free-index phrases from the titles and abstracts of INSPEC documents, and to evaluate the performance of the surrogate phrases in comparison with the true phrases. Several methods were used to select surrogate free-index phrases, and each method was compared statistically and empirically agains the actual free-index cases. In no case did the surrogates perform as well, but no clearcut cause for the phenomenon was found. If implicit phrases-those found in the free-index representation but not directly in the title/abstract-are determined to be an important part of the free-index phrase representation, then attempts to produce surrogate phrases automatically must incorporate a thesaurus. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-18254# Lavery (Thomas J.), Memphis, Tenn.
HYBRID GAS/ELECTRIC VEHICLE
T. J. Lavery 1985 5 p
(Contract DE-FG44-81R4-10501)
(DE85-016736; DOE/R4-10501/T1) Avail: NTIS HC A02/MF A01

The purpose of this project was to build a long-range, parallel hybrid gas/electric vehicle capable of driving beyond the commuter capabilities of series hybrid vehicles. It was envisioned that since the gas engine would be able to independently propel the car when needed and that the electric motor would be capable of doing the same, then you have a very desirable situation where this car can operate much more cheaply on electricity for the short distance runs under approximately 60 miles and also be able to propel the vehicle via the gas engine on the long-distance trips. During the time the car would be operating in the gas engine mode, it would be also recharging the 16 deep cycle batteries via the electric motor now being used as a generator. Then, even on long-distance trips, the electric motor could be used, after having

been fully or partially recharged, to even further reduce cost per mile. DOE

N86-18255# Cambridge Univ. (England). Dept. of Engineering.
[ACTIVITIES REPORT OF THE DEPARTMENT OF ENGINEERING] Annual Report, 1983/84
1985 34 p refs
Avail: NTIS HC A03/MF A01

Research in acoustics, aerodynamics and fluid mechanics, engineering design methods, electrical engineering, information engineering, manufacturing engineering, materials science, mechanical engineering, soil mechanics, structural engineering, thermodynamics, and turbomachinery is summarized. Author (ESA)

N86-18256# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
A REVIEW OF SPACE-RELATED THERMOPHYSICAL RESEARCH AT NLR
A. A. M. Delil 21 Jun. 1984 9 p refs Presented at 14th International Symposium on Space Technology and Science, Tokyo, Japan, 27 May - 1 Jun. 1984
(NLR-MP-84063-U; B8568103) Avail: NTIS HC A02/MF A01

Research concerning the thermal conductivity of (anisotropic) sheet materials, and of metallic and CFRP honeycomb sandwich panels; the thermal resistance of joints, interstice materials; the design and manufacture of a test rig for measuring the thermal conductance of loaded rotating bearings in a vacuum environment; the thermal modeling of rotating space mechanisms and the compilation of a handbook for the modeling of such mechanics; the thermal performance of multilayer insulation blankets for spacecraft; and constant and variable conductance heat pipes is summarized. Author (ESA)

N86-18257# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
STUDY ON A CITY'S SAFETY: POITIERS (FRANCE) [ETUDE DE LA SECURITE D'UNE VILLE: POITIERS]
Jacques Theys (Ministere de l'Environnement) and Odile Rocher 1985 21 p In FRENCH Presented at 3rd Seminaire Europeen sur la Securite des Systemes, Cannes, France, 19-21 Sep. 1984 (SNIAS-852-422-104) Avail: NTIS HC A02/MF A01

Safety in a city is examined utilizing methods developed in the aerospace industry. Poitiers (France) was chosen as a typical example of a middle sized city. A city safety model and the problems are discussed. No solutions are proposed since the study is limited to a description of the problem, including floods, pollution, ice formation, and fog. Author (ESA)

88 SPACE SCIENCES (GENERAL)

N86-18258# Helsinki Univ. of Technology, Espoo (Finland). Radio Lab.
PROCEEDINGS OF THE 19TH FINNISH ASTRONOMERS' DAYS
Seppo Urpo, ed. 1984 72 p refs Conference held in Espoo, Finland, 5 Jun. 1984 Sponsored by Elorg-Data and Nokia Elektroniikka
(Rept-S-162; ISBN-951-753-454-X; ISSN-0355-5712) Avail: NTIS HC A04/MF A01

Solar research; cosmology; development of galaxies and stars; optical properties of stars; dark clouds; molecular line radiation; radio radiation of quasars; and instrumentation in radio astronomy were discussed. For individual titles, see N86-18259 through N86-18270.

N86-18259# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CYCLIC MEAN FLOWS IN THE SUN AS A PROBE OF THE DYNAMO ACTION **c92**
Ilkka Tuominen, Fritz Krause (Academy of Sciences, Potsdam, East Germany), Guenther Ruediger, and Heikki Virtanen *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 2-16 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The observational evidence for variable mean flows (the differential rotation and meridional circulation) in the solar convection zone is explored, to understand them as a reaction of the cyclic magnetic field of the solar alpha omega dynamo to the flow. It is concluded that the observed properties of the variable flows in relation to the magnetic field can be a natural consequence of the dynamo excitation mechanism. These properties can be used to investigate the dynamo and the convection zone. Author (ESA)

N86-18260# Helsinki Univ. of Technology, Espoo (Finland).
RESULTS OF SOLAR RESEARCH STUDIES AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION **c92**
Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 17-21 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Radiometers (12 to 80 GHz) were used for solar observations. Results on active regions; quasi periodic fluctuations; periodic fluctuations; S-component; pole sources; microwave bursts; millisecond bursts; limb sources; Type 1 noise storms; and Type 3 bursts are summarized. Author (ESA)

N86-18261# Helsinki Univ. of Technology, Espoo (Finland).
SOLAR 160 MIN OSCILLATION AT MICROWAVE **c92**
Harri Teraesranta *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 22-25 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Solar 160 min oscillations were observed for a total of 98 hr with a radio telescope at 37 GHz. Although a lot of data was collected, the result is not clear as the oscillations are only seldom detected. Other periods than 160 min are frequently dominant, e.g., 120 and 80 min. As the observing material does not support even the detecting of the oscillation, the phase and order of the 160 min oscillations remain unknown. Author (ESA)

N86-18262# Turku Univ. (Finland). Observatory.
HOW DO GALAXIES MAKE SPIRAL ARMS: STOCHASTIC VERSUS GRAVITATIONAL **c90**
Gene Byrd *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 26-31 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The stochastic theory and the density wave theory of spiral patterns in disk galaxies are discussed. The stochastic mechanism is nongravitational, involving ejected shells from supernovae and star formation. The density wave results from the mutual gravitational interactions of the disk stars. Two armed spirals are best explained by the density wave theory. Small scale spurs in two armed spirals and chaotic spirals with many shorter arms are the domain of the stochastic mechanism. Computer simulations explain velocity disturbances seen ahead of the spur extending from NGC206 in M31 as effects of the spur induced gravitationally by the NGC206 gas complex. Such orbiting complexes can induce not only spurs near themselves but also density peaks elsewhere in the disk. Other gas complexes might form at these peaks to carry on the role of disturber. Thus small scale spurs may be gravitationally created extending the domain of the gravitational spiral arm mechanism to small scale and chaotic spiral structure. Author (ESA)

N86-18263# Helsinki Univ. (Finland).
COMPARISON OF OPTICAL EXTINCTION AND MOLECULAR LINE INTENSITIES IN THE CHAMAELEON 1 DARK CLOUD **c89**
Mikko Toriseva and Kalevi Mattila *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days

1984 p 36-39 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Star counts of the Cha 1 dark cloud were made. The extinction obtained is AB < or = 8m at the center of the cloud. Comparison of the H2CO and OH molecular line intensities with the extinction reveals a good correlation, and a similarity to the results for the Taurus dark cloud. Author (ESA)

N86-18264# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CORRELATED VARIABILITY IN THE W49N WATER MASER SOURCE **c90**
Tarja Liljestroem *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 40-44 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The 1.35 cm H2O emission line of the rotational transition 6 sub 16 to 5 sub 23 was observed with a 13.7 m radio telescope from November 1980 to October 1983. The time variation characteristics of H2O maser emission during a long time span in regions of recent or ongoing star formation were investigated. Results for W49N, the most powerful water maser source in our Galaxy are presented. In March 1983 W49N showed a particularly strong outburst reaching a luminosity of 0.3 in a single 40 kHz wide H2O line. Author (ESA)

N86-18265# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
COMPUTERS AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION **c89**
Niklas Holsti *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 45-48 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Computers used for controlling a radio telescope and receivers, and for data reduction are described. The computers are connected in master-slave pairs for command and data transfers. Two HP-2100, a TRS-80, a Commodore Pet, and a Modcomp-7821 are used. Author (ESA)

N86-18266# Helsinki Univ. of Technology, Espoo (Finland).
ANALOG TO DIGITAL (A/D) CONVERSION AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION **c89**
Kari Kuittinen, Erkki Oinaskallio, and Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 49-52 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

An analog to digital converter was constructed for a radio telescope. The 16 channel, 14 bit converter is in normal operation. Author (ESA)

N86-18267# Helsinki Univ. of Technology, Espoo (Finland).
CRYOGENIC MILLIMETER WAVE RECEIVER FOR THE METSAEHOVI RADIO TELESCOPE **c89**
Arto Lehto and Antti Raeisaenen *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 53-55 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

A cooled Schottky mixer receiver with DSB noise temperature of 80 to 140 K in the frequency range 75 to 95 GHz was built for radio astronomical observations. The quasioptical beam switching and calibration system is followed by a cooled low-noise mixer and FET amplifier at 1.4 GHz. The receiver is used for quasar and molecular line measurements and antenna tests with a 13.7 m radio telescope. Author (ESA)

N86-18268# Max-Planck-Inst. fuer Astronomie, Heidelberg (West Germany).
OPTICAL STUDY OF SHARPLESS 252 (NGC 2175) **c89**
Lauri Haikala *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 56-59 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The HII region-molecular cloud complex Sharpless 252 and the stars associated with it were studied by Fabry-Perot interferometry, photography, photoelectric UBVRI photometry and polarimetry, and photographic UBVR photometry. A three-dimensional model of S 252 and the discrete radio sources was constructed. It is concluded that a galactic density wave induced Rayleigh-Taylor instability is the probable star forming mechanism in S 252. Author (ESA)

N86-18269# Helsinki Univ. of Technology, Espoo (Finland).
OBSERVATIONS OF EXTRAGALACTIC RADIO SOURCES AT 8 AND 13.5 MM **c93**
E. Salonen, S. Haarala (Turku Univ., Finland), H. Teraesranta, H. Lehto (Turku Univ., Finland), S. Urpo, and M. Valtonen (Turku Univ., Finland) *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 62-65 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The flux densities of 19 quasars and BL Lac-type objects were observed continuously. About 1800 observations were made of 19 sources, 17 show significant variations. Observation results of 3C 273, BL Lac, and OJ 287 at frequencies 22 and 37 GHz, including results of CAO, are presented. Author (ESA)

N86-18270# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
RED SHIFT RADIATION: A MAJOR ELECTROMAGNETIC RADIATION MEASUREMENT **c93**
T. Jaakola *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 66-69 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Red shift radiation (RR) i.e., energy absorbed by the red shift effect in quasars and released as electromagnetic radiation, is proposed as the common factor of red shift, background radiation, and quasars. This unity depend only on the premises that there are local quasars and that the Universe is static. Quasar and 3 K radiation spectra both have peaks in the millimeter wavelengths. The flux variations in quasars there are stronger than in the longer wavelengths. Because the RR-radiation in quasars arises along steep temperature and red shift gradients in an anisotropic field, no thermal spectrum can be expected. For intergalactic RR, the source of the primary radiation is the homogeneous, isotropic and constant Universe; RR is in thermic equilibrium and must have a blackbody spectrum (but observed slightly deformed by the red shift). As most of the radiation is in the microwave background originated by the RR, the RR is the major radiation mechanism in the Universe. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-18271# South African Astronomical Observatory, Cape Province.
SOUTH AFRICAN ASTRONOMICAL OBSERVATORY CIRCULAR NO. 9
1985 115 p refs
(SAAOC-9) Avail: NTIS HC A06/MF A01

Circulars of the South African Astronomical Observatory, No. 9, 1985, contains articles on the following: Infrared Observations of Novae; Photometry and Radial Velocities of 27 Southern Galactic Cepheids; Optical and Infrared Photometry of Southern Early-Type Shell Stars and Pre-main-sequence Variables; Photometry of R. Coronae Borealis and Hydrogen-deficient Carbon Stars (198-2-3); and Photometry and Identification Charts for NGC 6067. For individual titles, see N86-18272 through N86-18276.

N86-18272# South African Astronomical Observatory, Cape Province.
INFRARED OBSERVATIONS OF NOVAE

R. M. Catchpole, I. S. Glass, G. Roberts, J. Spencer Jones, and P. A. Whitelock *In its* South African Astronomical Observatory Circular No. 9 1985 p 1-3 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

Infrared observations of novae which have been obtained at SAAO on various occasions over the past few years are presented. To date, the literature contains relatively new infrared studies of novae, and the question of why dust emission develops in some of these systems and not others remains unanswered. The data presented here, combined with similar observations from other establishments, should add to the general picture of nova development in the infrared. Author

N86-18273# South African Astronomical Observatory, Cape Province.
PHOTOMETRY AND RADIAL VELOCITIES OF 27 SOUTHERN GALACTIC CEPHEIDS
Iain M. Coulson and John A. R. Caldwell *In its* South African Astronomical Observatory Circular No. 9 1985 p 5-54 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

Some 950 radial velocities and about 1100 UBV(RI) sub c photometric measures of 27 Galactic Cepheids with R > 9d are presented. Pulsation periods are redetermined and light and color curves are produced by aligning the older photometry with new data using suitable zero-point adjustments. The new radial velocities prove to be of a much higher quality than the rather limited amount of similar data available from the literature, and so only the new data have been used in the production of the velocity curves. Parametric representations of these curves are presented in preparation for analysis in a future paper. Author

N86-18274# South African Astronomical Observatory, Cape Province.
OPTICAL AND INFRARED PHOTOMETRY OF SOUTHERN EARLY-TYPE SHELL STARS AND PRE-MAIN-SEQUENCE VARIABLES
D. Kilkenny, D. C. B. Whittet (Lancashire Polytechnic, Preston, England), J. K. Davies (Lancashire Polytechnic, Preston, England), A. Evans (Keele Univ., England), M. F. Bode (Keele Univ., England), E. I. Robson (Lancashire Polytechnic, Preston, England), and R. M. Banfield *In its* South African Astronomical Observatory Circular No. 9 1985 p 55-86 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

A catalogue of optical and infrared photometry is presented covering the epoch 1980 to 1984 for a sample of 53 pre-main-sequence stars and other emission-line objects, mainly of early spectral type. The JHKL data are generally simultaneous with optical photometry in either the UBVRI or Stromgren uvby systems, and the H beta index is used as a photometric monitor of spectrum variability. This catalogue will form a valuable data set for future studies of the nature and origin of variability in this class of object. Author

N86-18275# South African Astronomical Observatory, Cape Province.
PHOTOMETRY OF R CORONAE BOREALIS AND HYDROGEN-DEFICIENT CARBON STARS, 1982-3
D. Kilkenny, I. M. Coulson, J. D. Laing, J. Spencer Jones, and C. Engelbrecht *In its* South African Astronomical Observatory Circular No. 9 1985 p 87-96 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

Photoelectric UBVRI and uvby observations are presented for 4 hydrogen-deficient carbon stars, 12 known or suspected R Coronae Borealis stars and the probably related objects DY Cen and MV Sgr. Author

N86-18276# South African Astronomical Observatory, Cape Province.
CCD PHOTOMETRY OF GALACTIC CLUSTERS CONTAINING CEPHEID VARIABLES. PAPER 3: PHOTOMETRY AND IDENTIFICATION CHARTS FOR NGC 6067
Alistair Walker and Iain M. Coulson *In its* South African Astronomical Observatory Circular No. 9 1985 p 97-110 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

B and V band photometry obtained with the UCL-SAAO CCD Camera is presented for 1019 stars in NGC 6067 and 196 stars in an adjacent field. Author

N86-18277*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OBSERVATIONS OF THE J = 10 MANIFOLD OF THE PURE ROTATIONAL BAND OF PHOSPHINE ON SATURN
M. R. Haas (Mycol, Inc., Sunnyvale, Calif.), E. F. Erickson, D. Goorvitch, D. D. McKibbin, and D. M. Rank (California Univ., Santa Cruz) Jan. 1986 29 p refs
(NASA-TM-86851; Rept-85434; Preprint-Ser-042; NAS 1.15:86851) Avail: NTIS HC A03/MF A01 CSCL 03A

Saturn was observed in the vicinity of the J = 10 manifold of the pure rotational band of phosphine on 1984 July 10 and 12 from NASA's Kuiper Airborne Observatory with the facility far-infrared cooled grating spectrometer. On each night observations of the full disk plus rings were made at 4 to 6 discrete wavelengths which selectively sampled the manifold and the adjacent continuum. The previously reported detection of this manifold is confirmed. After subtraction of the flux due to the rings, the data are compared with disk-averaged models of Saturn. It is found that PH3 must be strongly depleted above the thermal inversion (approx. 70 mbar). The best fitting models consistent with other observational constaints indicate that PH3 is significantly depleted at even deeper atmospheric levels (< or = 500 mbar), implying an eddy diffusion coefficient for Saturn of 10 to the 4 cm sq/sec. Author

N86-18278# Argonne National Lab., Ill.
COMMENT ON AN UNUSUAL EVENT IN THE E594 DETECTOR FROM THE DIRECTION OF CYGNUS X-3
M. C. Goodman 1985 6 p Presented at the 19th International Cosmic Ray Conference, La Jolla, Calif., 11 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018341; CONF-850883-9) Avail: NTIS HC A02/MF A01

A small array located near the 80 m sq. E594 neutrino detector at Fermilab had a two week run. The author makes two comments related to ultra high energy gamma ray physics. The first regards the question of angular resolution from muons. In general, the angle of a muon will not reflect the angle of the shower for reasons which include transverse momentum at production, multiple scattering in the atmosphere, multiple scattering in the detector and detector angular resolution. In multiple muon events, the angle between each muon and the average muon angle samples all of these deviations. Therefore, this is a good measure of the angular resolution of the shower using the muons on an event by event basis. The second comment regards an unusual event from Cygnus X-3. DOE

N86-18279# Rome Univ. (Italy). Dipt. di Fisica.
PRELIMINARY RESULTS OF THE STUDY OF ULTRAVIOLET BACKGROUND WITH IUE
G. Auriemma, F. Bochicchio, A. Frenkel, and F. Massa 15 Mar. 1985 16 p refs Presented at 3rd Rome Meeting on Astrophysics on Cosmic Background Radiation and Fundamental Physics, Rome, 11-15 Dec. 1984
(Preprint-447) Avail: NTIS HC A02/MF A01

The UV background at high galactic latitude was obtained from IUE data. Results confirm previous observations for line emission and continuum. An interpretation of the peculiar shape of the continuum as due to the radiative decay of a cosmic relic particle with a mass of 15 eV and a lifetime < 10 to the 17th power years is considered. Predictions on the lifetime of massive neutrinos in the Glashow-Weinberg-Salam model indicates that this particle could not be identified with the ordinary neutrino. Lifetimes for neutrinos compatible with the upper limit can be obtained in the models of mirror leptons. The distribution in the

Universe of these particles seems to be related to the large scale matter distribution as observed in the Local Supercluster. This particle could be clusterized in the halo around the Supercluster with a density enhancement factor of 5. Author (ESA)

N86-18280# Amsterdam Univ. (Netherlands). Dept. of Physics and Astronomy.
DETERMINATION OF SPECTRAL DISTRIBUTIONS AND INSTRUMENTAL MAGNITUDES OF PLANETS
J. W. Hovenier, G. Cornet, P. Stammes, and W. R. Burke, ed. (ESA, Paris) Paris ESA Mar. 1985 108 p refs
(ESA-STR-214; ISSN-0379-4067) Avail: NTIS HC A06/MF A01

An algorithm for calculating instrumental magnitudes in the 300 to 1100 nm range for the Moon and all planets except Pluto is presented. A survey and literature compilation was made to produce best estimates for the spectral distributions of the light reflected by each object. The results, together with error estimates, are presented in tables. The spectral distributions form the basis for the algorithm which provides magnitudes for the disk integrated light, as a function of the object selected, phase angle, and distances to the Sun and observer. Information to enable the calculation of the output signal of an ideal slit sensor scanning the disk of an object is provided. Author (ESA)

N86-18263# Helsinki Univ. (Finland).
COMPARISON OF OPTICAL EXTINCTION AND MOLECULAR LINE INTENSITIES IN THE CHAMAELEON 1 DARK CLOUD
Mikko Toriseva and Kalevi Mattila *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 36-39 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18265# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
COMPUTERS AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION
Niklas Holsti *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 45-48 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18266# Helsinki Univ. of Technology, Espoo (Finland).
ANALOG TO DIGITAL (A/D) CONVERSION AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION
Kari Kuittinen, Erkki Oinaskallio, and Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 49-52 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18267# Helsinki Univ. of Technology, Espoo (Finland).
CRYOGENIC MILLIMETER WAVE RECEIVER FOR THE METSAEHOVI RADIO TELESCOPE
Arto Lehto and Antti Raeisaenen *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 53-55 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18268# Max-Planck-Inst. fuer Astronomie, Heidelberg (West Germany).
OPTICAL STUDY OF SHARPLESS 252 (NGC 2175)
Lauri Haikala *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 56-59 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-18281# Lawrence Livermore National Lab., Calif.
NUCLEAR ASTROPHYSICS AWAY FROM STABILITY
G. J. Mathews, W. M. Howard, K. Takahashi, and R. A. Ward Aug. 1985 13 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract W-7405-eng-48)
(DE85-018188; UCRL-92470; CONF-850942-26) Avail: NTIS HC A02/MF A01

Explosive astrophysical environments invariably lead to the production of nuclei away from stability. An understanding of the dynamics and nucleosynthesis in such environments is inextricably coupled to an understanding of the properties of the synthesized nuclei. In this talk a review is presented of the basic explosive nucleosynthesis mechanisms (s-process, r-process, n-process, p-process, and rp-process). Specific stellar model calculations are discussed and a summary of the pertinent nuclear data is presented. Possible experiments and nuclear-model calculations are suggested that could facilitate a better understanding of the astrophysical scenarios. DOE

N86-18282# European Space Agency, Paris (France).
AD ASTRA HIPPARCOS. THE EUROPEAN SPACE AGENCY'S ASTROMETRY MISSION
M. A. C. Perryman, comp. and Norman Longdon, comp. Jun. 1985 50 p Original contains color illustrations
(ESA-BR-24; ISSN-0250-1589) Avail: NTIS HC A03/MF A01

The HIPPARCOS spaceborne astrometry program is summarized. The primary experiment on board the satellite will measure the positions, proper motions and parallaxes of 100,000 preselected stars to within 0.002 arcsec for positions and parallaxes and 0.002 arcsec a year for proper motions. A second experiment, Tycho, which will exploit the data produced by the satellite's attitude measurement system, will yield astrometric and photometric data of lower precision, but for a very much larger number of stars. The star positions measured by Hipparcos will provide a uniform reference system of unprecedented precision, of considerable importance for studies of the Earth's motion, as a framework for studies of the Solar System, and as a reference for studies in ground and space-based astronomy. As well as providing a high-precision reference system, the accurate measurement of stellar positions, and how they vary with time, will give the basic data necessary for calculating distances to the stars within our Galaxy, and information on the large and small scale stellar motions within it. Author (ESA)

N86-18262# Turku Univ. (Finland). Observatory.
HOW DO GALAXIES MAKE SPIRAL ARMS: STOCHASTIC VERSUS GRAVITATIONAL
Gene Byrd *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 26-31 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18264# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CORRELATED VARIABILITY IN THE W49N WATER MASER SOURCE
Tarja Liljestroem *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 40-44 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

No abstracts in this category.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-18283# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
SOLAR WIND CONTROL OF THE POLAR CUSP
E. Friis-Christensen 1985 39 p refs Presented at AGU Chapman Conference on Solar Wind-Magnetosphere Coupling, Pasadena, Calif., 12-15 Feb. 1985
(DMI-Geophys-Papers-B-72; ISBN-87-7478-254-2) Avail: NTIS HC A03/MF A01

Observations of the distribution of particles, electric fields, and currents in the polar cusp, particularly aspects which enable a comparison between ground-based and space-based observations are discussed. The cusp is characterized by intense fluxes of very low energy electrons, but a definition of the cusp based upon this characteristic is insufficient to exclude other sources like the dayside extension of the plasma-sheet boundary layer. The location of the cusp is partly controlled by Bz. For northward interplanetary magnetic field (IMF), observations support a polar cusp and polar cap convection pattern dominated by an extra two-cell pattern for all By. The relative sizes of the two cells, however, is related to the sign and magnitude of By. For southward IMF the prenoon sector shows a double convection reversal for By <0 compared to a single for By >0. Space and ground-based observations support models of two IMF controlled convection cells. Author (ESA)

N86-18259# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CYCLIC MEAN FLOWS IN THE SUN AS A PROBE OF THE DYNAMO ACTION
Ilkka Tuominen, Fritz Krause (Academy of Sciences, Potsdam, East Germany), Guenther Ruediger, and Heikki Virtanen *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 2-16 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18260# Helsinki Univ. of Technology, Espoo (Finland).
RESULTS OF SOLAR RESEARCH STUDIES AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION
Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 17-21 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18261# Helsinki Univ. of Technology, Espoo (Finland).
SOLAR 160 MIN OSCILLATION AT MICROWAVE
Harri Teraesranta *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 22-25 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

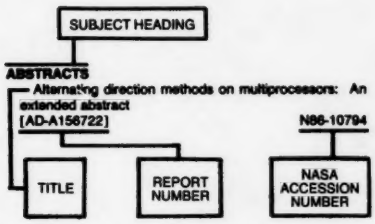
N86-18269# Helsinki Univ. of Technology, Espoo (Finland).
OBSERVATIONS OF EXTRAGALACTIC RADIO SOURCES AT 8 AND 13.5 MM
E. Salonen, S. Haarala (Turku Univ., Finland), H. Teraesranta, H. Lehto (Turku Univ., Finland), S. Urpo, and M. Valtonen (Turku Univ., Finland) *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 62-65 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18270# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
RED SHIFT RADIATION: A MAJOR ELECTROMAGNETIC RADIATION MEASUREMENT
T. Jaakola *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 66-69 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

99 GENERAL

No abstracts in this category.

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7051).

A

ABLATION
Thermal transport, mass-ablation and preheat in laser-target experiments
[DE85-017584] N86-17742

ABSORPTANCE
Measurement of thermo-optical properties of thermal control materials
[ESA-PSS-01-709-ISSUE-1] N86-17375

ABSORPTION COOLING
Corrosion of materials in absorption heating and refrigeration fluids
[DE85-018140] N86-17585

ABSORPTION SPECTRA
Systematic view of optical absorption spectra in the actinide series
[DE85-018406] N86-18225

ABSORPTIVITY
Heat transfer from a high temperature condensable mixture. 2: Sedimentation of fog condensate
[DE85-018377] N86-17673

ABSTRACTS
Study of free-index phrases
[PB85-240117] N86-18253

ACCELERATED LIFE TESTS
On the asymptotic properties of a kernel-type quantile estimator from censored samples
[AD-A160302] N86-18108

ACCELERATION (PHYSICS)
Critical analysis of turbulence restitution from acceleration measurements --- aircraft construction
[ONERA-RT-3/3567-RY-C40-R] N86-17340
Simulation of flame acceleration in unconfined vapor cloud explosions
[VTT-RR-357] N86-17698
Shock response spectrum at low frequencies
[DE85-018273] N86-17797

ACCELEROMETERS
The application of optimal control methods to the deconvolution of velocity meter signals
[ISVR-TR-128] N86-17717
Development of passive acoustic imaging for large heat transfer components
[DE85-018384] N86-18126

ACCESS CONTROL
SSMS: A Secure Software Management System
[AD-A159489] N86-18008

ACCIDENT PREVENTION
Systems safety: Phantom or reality
[SNIAS-852-422-103] N86-17330
Study on a city's safety: Poitiers (France)
[SNIAS-852-422-104] N86-18257

ACCIDENTS
Sensitivity, applicability and validation of bi-Gaussian off- and on-line models for the evaluation of the consequences of accidental releases in nuclear facilities --- air pollution
[EUR-9385-EN] N86-17897

ACCURACY
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704
Development of an accurate algorithm for exp(Bt)
[AD-A160060] N86-18015
How many bootstraps?
[AD-A160043] N86-18106

ACID RAIN
Acid Deposition System (ADS) data base, data summary procedures and statistical reporting of spatial patterns and trends
[DE85-017910] N86-17907
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909
Acid rain: A primer on what, where, and how much
[DE85-017864] N86-17910
Effects of acid rain on forest nutrient status
[DE85-018120] N86-17911
Deposition of sulfur in Europe: Methods to construct unbiased source-receptor matrices from data of a limited period (1976 - 1982). A meteorological contribution to the IIASA Regional Acidification Information and Simulation (RAINS) model
[KNMI-TR-86] N86-17923

ACIDITY
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

ACIDS
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

ACOUSTIC ATTENUATION
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123

ACOUSTIC EMISSION
In-process acoustic emission monitoring of laser welds
[DE85-017184] N86-17772
NDE (Non-Destructive Evaluation) publications, 1982
[PB85-244069] N86-17776
Development of passive acoustic imaging for large heat transfer components
[DE85-018384] N86-18126

ACOUSTIC EXCITATION
Effect of charge and aerodynamic properties of particles on electrified fabric filtration
[DE86-000013] N86-17628

ACOUSTIC IMPEDANCE
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128

ACOUSTIC MEASUREMENT
Stochastic measurements and systems implications
[AD-A159827] N86-18122
Array positioning requirements
[AD-A159866] N86-18124
Development of passive acoustic imaging for large heat transfer components
[DE85-018384] N86-18126
Scattering of an acoustic field by a nonhomogeneous nonuniform flow
[ONERA-P-1985-1] N86-18127

ACOUSTIC PROPAGATION
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128

ACOUSTIC SCATTERING
Scattering of an acoustic field by a nonhomogeneous nonuniform flow
[ONERA-P-1985-1] N86-18127
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128

ACOUSTIC VELOCITY
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123

ACOUSTICS
Activities report of the Institute of Sound and Vibration Research N86-17685
The use of acoustical caustics in fracture mechanics N86-17781
Activities report of the Department of Engineering N86-18255

ACRYLONITRILES
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501

ACTINIDE SERIES
Systematic view of optical absorption spectra in the actinide series
[DE85-018406] N86-18225

ACTIVATION ENERGY
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220

ACTUATORS
A control system design approach for flexible spacecraft
[NASA-TM-87599] N86-17373
A CSMP commutation model for design study of a brushless dc motor power conditioner for a cruise missile fin control actuator
[AD-A159855] N86-17621
The NA27 trigger --- proton beam bubble chamber experiment (NA27)
[USIP-85-10] N86-18172

ADAPTIVE FILTERS
Low cost voice compression for mobile digital radios
[NASA-CR-176490] N86-17594
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598

ADDITIVES
Further research on high open circuit voltage in silicon solar cells N86-17842
Superlattices and multilayer structures for high efficiency solar cells N86-17850
A possible radiation-resistant solar cell geometry using superlattices N86-17851

ADDRESSING
On the garbage collection of block structured memories
[RSRE-85006] N86-18043

ADHESION
Modification of vulcanized elastomer surfaces to diminish adherence to metals
[CETIM-100340] N86-17575

ADHESION TESTS
Use of peel values in structural analysis N86-17394
Metallizing of fiber reinforced composites
[MBB-Z-46/48] N86-17482

ADHESIVE BONDING
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures N86-17771

Residual strength of bonded stiffened panels: Prediction and experimental verification
[NLR-TR-83066-U] N86-17808

ADHESIVES
The hardening of technical adhesives
[CETIM-101370] N86-17576
Possibilities of protection from abrasive and adhesive wear
[BLL-RISLEY-TR-5166-(9091.9F)] N86-17744

AERIAL PHOTOGRAPHY
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterschelde (the Netherlands)
[MDLK-R-8509] N86-17722
Analysis of the radiometric relation between false color aerial photographs and multispectral scanning (MSS) images
[MDLK-R-8337] N86-17829
Activities report in remote sensing training N86-17830

AEROBRAKING
The O sub 2/H sub 2 propulsion module for planetary spacecraft injection energy augmentation N86-17422

AERODYNAMIC CHARACTERISTICS
An interactive design system for winged space vehicle N86-17269
The analysis of practical transonic swept wings with and without boundary layer effects N86-17300
Effect of dynamic stall and elastic parameters on the fundamental mechanisms of helicopter vibrations
[AD-A160022] N86-17355
Effect of charge and aerodynamic properties of particles on electrified fabric filtration
[DE86-000013] N86-17628

AERODYNAMIC COEFFICIENTS
Development of subsonic computational aerodynamic program using panel method N86-17286

AERODYNAMIC CONFIGURATIONS
A numerical solution of the transonc integral equation and its application to three-dimensional transonic wing design N86-17298
Application of a constrained inverse method in the aerodynamic design of a low speed wing-slat configuration
[NLR-TR-83123-U] N86-17320
A survey of computational methods for subsonic and transonic aerodynamic design
[NLR-MP-84066-U] N86-17323
Aerodynamic design trends for commercial aircraft
[NASA-TM-77976] N86-17338
Estimation of sideforce, yawing moment and rolling moment derivatives due to rate of yaw for complete aircraft at subsonic speeds
[ESDU-84002] N86-17357
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699

AERODYNAMIC DRAG
Estimation of drag due to inoperative turbo-jet and turbo-fan engines using data item nos. 81009 and 84004
[ESDU-84005] N86-17305
A rapid method for estimating equivalent parabolic polars from wind-tunnel tests
[RAE-TM-AERO-2034] N86-17309
Low speed aerodynamic characteristics of a two-dimensional sail wing with adjustable slack of the sail
[VTH-LR-307] N86-17314

AERODYNAMIC NOISE
Analysis of the noise emitted by a tail rotor N86-18129
Sound excitation during vortex-airfoil interaction
[MPIS-MITT-80] N86-18130

AERODYNAMIC STALLING
Numerical analysis about flow over an aerofoil with a large angle of attack N86-17291

AERODYNAMICS
An interactive design system for winged space vehicle N86-17269
Development of computational fluid dynamics at NASA Ames Research Center N86-17275
Publications, catalog 1985 N86-18249
Activities report of the Department of Engineering N86-18255

AEROELASTICITY
Subsonic unsteady aeroelasticity: The potential method applied to lifting surfaces
[ONERA-RT-21/3064-RY-045-R] N86-17315

AERONAUTICAL ENGINEERING
The role of computational fluid dynamics in aeronautical engineering
[REPT-2] N86-17296

AEROSOLS
Continuous measurement of sodium aerosols in the air N86-17894
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
Expedient methods of respiratory protection. 3: Submicron particle tests and summary of quality factors
[TI85-018278] N86-17983
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115

AEROSPACE ENGINEERING
Activities report in aerospace research, with data concerning the scientific committee NLR-NIVR, international cooperation concerning AGARD, DNW, GARTEUR and cooperation with Indonesia N86-17588
Array technology and applications N86-17872

AEROSPACE ENVIRONMENTS
A review of the physical ageing of epoxy resins and their carbon fibre composites
[RAE-TM-1051(MAT/STR)] N86-17473
Space Photovoltaic Research and Technology 1985: High Efficiency, Space Environment, and Array Technology
[NASA-CP-2408] N86-17839
Burst annealing of electron damage in silicon solar cells N86-17853
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858
Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864
Space Environment Workshop N86-17871

AEROSPACE INDUSTRY
Applications of holographic interferometry to nondestructive inspections of composite material structures
[SNIAS-852-430-112] N86-17492
Filament winding: An industrial procedure --- composite materials
[SNIAS-852-430-117] N86-17496
Personnel activities report in aerospace research N86-18243

AEROSPACE SCIENCES
Activities report in space research in Norway
[SAD-125-T] N86-17361
Films, catalog 1985 --- aerospace N86-18250

AEROSPACE SYSTEMS
USSR report: Electronics and electrical engineering
[JPRS-UEE-84-016] N86-17640

AEROSPACE TECHNOLOGY TRANSFER
Composite materials: A source of innovation --- aircraft industry
[SNIAS-852-430-113] N86-17493
Filament winding: An industrial procedure --- composite materials
[SNIAS-852-430-117] N86-17496
Study on a city's safety: Poitiers (France)
[SNIAS-852-422-104] N86-18257

AFTERBODIES
An experimental investigation of supersonic flow over axisymmetric afterbodies with a centered propulsive jet at angles of attack
[FFA-TN-1985-10] N86-17317
A wind tunnel investigation of the effect of a propulsive jet on controls located on a conical afterbody in subsonic and supersonic free streams
[FFA-TN-1985-11] N86-17318

AGING (MATERIALS)
A review of the physical ageing of epoxy resins and their carbon fibre composites
[RAE-TM-1051(MAT/STR)] N86-17473
Oxyluminescence study of the degradation of filled and unfilled rubbers
[BR94542] N86-17567

AGING (METALLURGY)
Investigations concerning the aging behavior of heat-insulated aluminum composite profiles
[BMFT-FB-T-85-086] N86-17483
Internal friction study of strain aging in alloys
[DE85-018367] N86-17543

AGRICULTURE
Study of effects of pump station Olden Eibergen (Netherlands) on agriculture using remote sensing and hydrological models
[NOTA-1544] N86-17833

AIR COOLING
Continuous measurement of sodium aerosols in the air N86-17894

AIR FLOW
Evaluation of data obtained from atmospheric laser Doppler velocimeter
[NASA-CR-178474] N86-17703

AIR INTAKES
Design of nonaxysymmetric structures (turbojet engine nacelle element)
[SNIAS-852-430-119] N86-17498

AIR POLLUTION
Pollutant dispersal --- air pollution, conference
[VKI-LS-1985-02] N86-17895
Numerical techniques and dispersion modeling --- air pollution N86-17898
Dispersion of heavy gases N86-17899
Fluctuating wind effects --- air pollution - pollution dispersal N86-17900
Lagrangian modeling of turbulent dispersion --- air pollution N86-17901
Fluid modeling of flow and dispersion in the atmosphere: Facilities and techniques --- air pollution N86-17902
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913
Measuring the electric field in the atmosphere in connection with investigations on the dispersion of air pollution
[S/T-REPT-VOL-2-NO-10] N86-17924
Visibility model verification by image processing techniques
[PB85-222800] N86-17925

AIR SAMPLING
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906

AIR TO AIR MISSILES
Fast cook-off tests of the AMRAAM air vehicle N86-17389

AIR TRAFFIC CONTROL
Activities in air traffic control N86-17331
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
Comparison of a jump-diffusion tracker with a Kalman tracker: An evaluation with emphasis on air traffic control
[NLR-TR-83063-U] N86-17335
An efficient filter for abruptly changing systems
[NLR-MP-84071-U] N86-18056

AIR TRANSPORTATION
Activities report for the West German civil airports. Part 2: Tables
[ISBN-3-87977-056-5-PT-2] N86-17327

AIR WATER INTERACTIONS
Estimation of sea-surface windspeed from whitecap cover: Statistical approaches compared empirically and by simulation
[AD-A159816] N86-17969
A program for International Polar Oceans Research (PIPOR)
[ESA-SP-1074] N86-17972

AIRBORNE EQUIPMENT
The application of sensors in light tests
[NLR-MP-84056-U] N86-17352

AIRBORNE/SPACEBORNE COMPUTERS
Hardware/software Failure Mode Effect Analysis (FMEA) applied to airplane safety
[NLR-MP-84073-U] N86-17325
Activities report in aerospace research, with data concerning the scientific committee NLR-NIVR, international cooperation concerning AGARD, DNW, GARTEUR and cooperation with Indonesia N86-17588

AIRCRAFT ACCIDENTS
Controlled Impact Demonstration (CID)
[GPO-46-870] N86-17324
A comparison of postmortem coronary atherosclerosis findings in general aviation pilot fatalities
[AD-A159811] N86-17982

AIRCRAFT CONSTRUCTION MATERIALS
Flexible intermediate film with a large temperature range for aeronautical utilization --- windshields N86-17339
Lecture notes on fatigue, static tensile strength and stress corrosion of aircraft materials and structures. Part 2: Figures
[VTH-LR-360-PT-2] N86-17345
Ceramic fiber composites: Manufacturing and performances
[SNIAS-852-430-118] N86-17497
Metallurgical and assembling fatigue characterization of the alloys 2214T451, 7010T73651 and 2024T351 in plates (50 to 70 mm, 120 to 125 mm) and in thick forged bars
[DGT-25.919] N86-17552
Influence of corrosion pits and environmental moisture on the fatigue behavior of 35 NCD 16 THR-ESR
[M3-450900] N86-17555
Study of the influence of pitting corrosion on the fatigue characteristics of Marvac 18
[M2-666500] N86-17556
Residual strength of bonded stiffened panels: Prediction and experimental verification
[NLR-TR-83066-U] N86-17808
Separation of airborne and structureborne noise radiated by plates constructed of conventional and composite materials with applications for prediction of interior noise paths in propeller driven aircraft
[NASA-TM-87414] N86-18121

AIRCRAFT CONTROL
The biomorphic model of the human pilot
[VTH-LR-310] N86-17991
Computer Aided Design (CAD) at the National Aerospace Laboratory (Netherlands) with the accent on aircraft flight control systems
[NLR-MP-84032-U] N86-18030
AIRCRAFT DESIGN
The comparison of the transonic airfoil calculation by NSFOIL with the wind tunnel test data at high Reynolds number N86-17295
The role of computational fluid dynamics in aeronautical engineering
[REPT-2] N86-17296
Application of computational aerodynamics to wing design N86-17297
A numerical solution of the transonc integral equation and its application to three-dimensional transonic wing design N86-17298
A wing design based on the three-dimensional transonic inverse method and the comparison with the wind tunnel testing data N86-17299
Aerodynamic design trends for commercial aircraft
[NASA-TM-77976] N86-17338
Damage-tolerant aircraft design
[NLR-MP-84005-U] N86-17342
Optimization in design processes: An informatics point of view
[NLR-MP-84074-U] N86-17349
Computer Aided Design (CAD) at the National Aerospace Laboratory (Netherlands) with the accent on aircraft flight control systems
[NLR-MP-84032-U] N86-18030
AIRCRAFT ENGINES
Description of a nondestructive facility using holographic interferometry
[SNIAS-852-430-105] N86-17726
AIRCRAFT HAZARDS
Controlled Impact Demonstration (CID)
[GPO-46-870] N86-17324
AIRCRAFT INDUSTRY
Systems safety: Phantom or reality
[SNIAS-852-422-103] N86-17330
Study of composite material curing molds
[DGT-26.817] N86-17486
Composite materials: A source of innovation --- aircraft industry
[SNIAS-852-430-113] N86-17493
AIRCRAFT LANDING
Helicopter-ship qualification testing
[NLR-MP-84062-U] N86-17343
Operational application of the STALINS method for measuring take-off and landing trajectories
[NLR-TR-83010-U] N86-17346
AIRCRAFT MANEUVERS
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
Three-dimensional flight-path reconstruction by means of spline approximation
[NLR-TR-83091-U] N86-17347
AIRCRAFT MODELS
Development of a sensitivity analysis technique for multiloop flight control systems
[NASA-CR-166619] N86-17358
AIRCRAFT NOISE
Environment-friendly propeller aircraft with a maximum weight of 5700 kg, and motor gliders: Publication of the noise values N86-17341
Noise assessment around Schiphol airport (the Netherlands) in 1981
[NLR-TR-82034-U] N86-17915
Noise assessment around Rotterdam airport (the Netherlands) in 1981
[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922
Separation of airborne and structureborne noise radiated by plates constructed of conventional and composite materials with applications for prediction of interior noise paths in propeller driven aircraft
[NASA-TM-87414] N86-18121
Analysis of the noise emitted by a tail rotor N86-18129
Helicopter internal noise treatment. Recent methodoigies and practical applications
[SNIAS-852-210-102] N86-18133
AIRCRAFT PERFORMANCE
Estimation of drag due to inoperative turbo-jet and turbo-fan engines using data item nos. 81009 and 84004
[ESDU-84005] N86-17305
Critical analysis of turbulence restitution from acceleration measurements --- aircraft construction
[ONERA-RT-3/3567-RY-C40-R] N86-17340
AIRCRAFT PILOTS
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport
[REPT-1] N86-17985
AIRCRAFT SAFETY
Systems safety: Phantom or reality
[SNIAS-852-422-103] N86-17330
AIRCRAFT STABILITY
Hardware/software Failure Mode Effect Analysis (FMEA) applied to airplane safety
[NLR-MP-84073-U] N86-17325
Estimation of sideforce, yawing moment and rolling moment derivatives due to rate of yaw for complete aircraft at subsonic speeds
[ESDU-84002] N86-17357
AIRCRAFT STRUCTURES
Damage-tolerant aircraft design
[NLR-MP-84005-U] N86-17342
Lecture notes on fatigue, static tensile strength and stress corrosion of aircraft materials and structures. Part 2: Figures
[VTH-LR-360-PT-2] N86-17345
Feasibility study of a device to control aircraft electromagnetic protection --- transparence
[ONERA-RS-10/3466-PY] N86-17637
Design of hat-stiffened composite panels under uniaxial compression and shear. Minimum mass optimization based on a simplified theory
[VTH-LR-312] N86-17806
AIRFOIL PROFILES
A system for computer aided analysis and design of multielement airfoils: MAD
[NLR-TR-83136-U] N86-17321
AIRFOILS
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations N86-17273
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment N86-17278
Numerical analysis for steady transonic flows past an airfoil using AF scheme N86-17289
Numerical solution of viscous compressible flows past an airfoil using unconditionally stable explicit method N86-17290
Numerical analysis about flow over an aerofoil with a large angle of attack N86-17291
Numerical analysis of transonic flow around two-dimensional airfoil by solving Navier-Stokes equations N86-17292
Analysis of high Reynolds number transonic flow around an airfoil N86-17293
Validation and comparison with experiment of a high Reynolds number transonic flow airfoil analysis code NSFOIL N86-17294
The comparison of the transonic airfoil calculation by NSFOIL with the wind tunnel test data at high Reynolds number N86-17295
The role of computational fluid dynamics in aeronautical engineering
[REPT-2] N86-17296
Studies of the flow field near a NACA 4412 aerofoil at nearly maximum lift
[RAE-TM-AERO-2026] N86-17307
Application of a constrained inverse method in the aerodynamic design of a low speed wing-slat configuration
[NLR-TR-83123-U] N86-17320
Vorticity shedding over two-dimensional bodies N86-17656
Sound excitation during vortex-airfoil interaction
[MPIS-MITT-80] N86-18130
AIRLINE OPERATIONS
Activities report for the West German Civil Airports. Part 1: Text
[ISBN-3-87977-056-5-PT-1] N86-17326
Activities report for the West German civil airports. Part 2: Tables
[ISBN-3-87977-056-5-PT-2] N86-17327
AIRPORTS
Activities report for the West German Civil Airports. Part 1: Text
[ISBN-3-87977-056-5-PT-1] N86-17326
Activities report for the West German civil airports. Part 2: Tables
[ISBN-3-87977-056-5-PT-2] N86-17327
Noise assessment around Schiphol airport (the Netherlands) in 1981
[NLR-TR-82034-U] N86-17915
Noise assessment around Rotterdam airport (the Netherlands) in 1981
[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922
Installation of automated weather observing systems by FAA (Federal Aviation Administration) at commercial airports is not justified
[PB85-241347] N86-17964
ALGAE
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728
ALGEBRA
On the consistency of Koomen's fair abstraction rule
[CWI-CS-R8511] N86-18094
ALGORITHMS
Numerical analysis about flow over an aerofoil with a large angle of attack N86-17291
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
Comparison of a jump-diffusion tracker with a Kalman tracker: An evaluation with emphasis on air traffic control
[NLR-TR-83063-U] N86-17335
Learning algorithms in the infrared
[DE85-016441] N86-17507
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
An improved pressure iteration procedure for the SOLA algorithm applied to the solution of the incompressible Navier-Stokes equations
[VKI-TM-35] N86-17682
Development and application of a direct algorithm adapted to the discrete Fourier transform for the determination of the modal parameters of linear vibration systems
[RUB-IFM-MITT-42] N86-17786
Advanced servomanipulator development
[DE85-017720] N86-17989
Research in computer science
[NASA-CR-176486] N86-17998
A graph theoretic algorithm for contour surface display generation
[AD-A159822] N86-18000
Parallel Cholesky factorization on a hypercube multiprocessor
[DE85-018121] N86-18002
Probabilistic analysis of fault trees using pivotal decomposition
[AD-A159856] N86-18012
Development of an accurate algorithm for exp(Bt)
[AD-A160060] N86-18015
Time-driven algorithms for distributed control --- computer networks
[CWI-CS-R8510] N86-18037
Channel coding with the (255, 255-2T) Reed-Solomon codes over CF (256)
[NLR-TR-83149-U] N86-18042
An efficient filter for abruptly changing systems
[NLR-MP-84071-U] N86-18056
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060
ANOVA model fitting via sparse matrix computations
[DE85-017070] N86-18069

Waveform vector quantization: The algebraic approach
[ENST-85C004] N86-18096
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128
Anamorphic gradient index lens systems N86-18177
Study of free-index phrases
[PB85-240117] N86-18253

ALIGNMENT
Programmable high power beam damper for the Tevatron
[DE85-017441] N86-18167

ALKALI HALIDES
First order phase transformations: Scaling relations for grain self-correlation functions
[DE85-017509] N86-18213

ALKALI METALS
ALKACYCL: A basic computer program for the analysis of alkali metal Rankine power cycles
[DE85-018125] N86-18022

ALKALIES
Influence of catalytic additions on ferric-oxide reduction
[BLL-BISI-23009-(9022.060)] N86-17526

ALKENES
Surface-enhanced raman spectroscopy as a probe of adsorbate-surface bonding: Simple alkenes and alkynes adsorbed at gold electrodes
[AD-A160033] N86-17503

ALKYNES
Surface-enhanced raman spectroscopy as a probe of adsorbate-surface bonding: Simple alkenes and alkynes adsorbed at gold electrodes
[AD-A160033] N86-17503

ALLOYS
Internal friction study of strain aging in alloys
[DE85-018367] N86-17543
Diffusional creep of multicomponent systems
[DE86-000184] N86-17549
Compositional variation in the near surface layers: An atom probe study of surface segregation in alloys N86-18207

ALPHA DECAY
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) mor.omer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728

ALPHA PARTICLES
Radioactive ion beam research at LLNL
[DE85-018183] N86-18156

ALTERNATING CURRENT
Alternating currrent buses for low Earth orbits: A viable alternative N86-17435
A new small signal ac analysis tool for space power systems N86-17443
An alternative for satellite power distribution N86-17450
Designing high frequency ac inductors using ferrite and Molypermalloy Powder Cores (MPP) N86-17452

ALTERNATIVES
Enhancing the impact toughness of low alloy steel by micro-alloying and modification
[BLL-M-36490-(5828.4)] N86-17522

ALUMINATES
Impregnant composition in dispenser cathodes
[AD-A160044] N86-17622

ALUMINUM
Investigations concerning the aging behavior of heat-insulated aluminum composite profiles
[BMFT-FB-T-85-086] N86-17483
Raman spectroscopic study of molten salt electrolysis of light metals
[DE85-017480] N86-17509
The corrosion properties of aluminum bronzes: A literature review
[KIS-1985-3E] N86-17532
Recent developments concerning segregation and fracture at grain boundaries
[DE85-018106] N86-17547
Basic aspects of ion beam mixing
[DE85-018391] N86-18145
Disorder and transport in lithium/aluminum
[DE85-018389] N86-18231

ALUMINUM ALLOYS
The mechanical property data base from a cooperative program on first generation PM (Powder Metallurgy) aluminums
[AD-A159779] N86-17534
Metallurgical and assembling fatigue characterization of the alloys 2214T451, 7010T73651 and 2024T351 in plates (50 to 70 mm, 120 to 125 mm) and in thick forged bars
[DGT-25.919] N86-17552
Pressing effect and stress corrosion cracking of an extruded AlZnMgCu type aluminum alloy
[BMFT-FB-T-85-087] N86-17558
Development of cobalt-free high grade permanent magnets on the basis of MnAl alloys
[BMFT-FB-T-85-099] N86-17559
The effect of blunt notches and saw cuts on the static strength of 2024-T3 and 7075-T6 sheet material --- aluminum alloys
[VTH-LR-313] N86-17807
Fatigue rated fastener systems in aluminum alloy structural joints --- aircraft structures
[NLR-MP-83045-U] N86-17809
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212

ALUMINUM COMPOUNDS
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513

ALUMINUM GALLIUM ARSENIDES
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
Experience with OMCVD production of GaAs solar cells N86-17852

ALUMINUM OXIDES
Ceramic composites made by sol-gel processing
[SNIAS-852-430-103] N86-17491
Amorphous aluminum hydroxide gels
[SNIAS-852-430-104] N86-17561
Gelation of aluminum hydroxide sols
[SNIAS-852-430-19] N86-17562

AMMONIA
Reaction enhancement of heterogeneously catalyzed reactions by concentration forcing
[DE86-000220] N86-17514
Polar fluids: Photoemission and electronic energy levels
[DE85-016974] N86-18227

AMORPHOUS MATERIALS
The boriding of refractory metals
[BLL-BISI-23037-(9022.060)] N86-17527
Amorphous aluminum hydroxide gels
[SNIAS-852-430-104] N86-17561
Overview of SERI's high efficiency solar cell research N86-17841
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
Improved method of preparing p-i-n junctions in amorphous silicon semiconductors
[DE85-017736] N86-18217
Narrow band gap amorphous silicon semiconductors
[DE85-017753] N86-18218
Inelastic scattering from amorphous solids
[DE85-018371] N86-18230

AMORPHOUS SEMICONDUCTORS
Ultra-fast photoconductive switches
[RSRE-MEMO-3784] N86-18208

AMPLIFICATION
Direction of arrival estimation of eigenstructure methods with unknown sensor gain and phase
[AD-A160027] N86-18065

AMPLIFIER DESIGN
Composite operational amplifiers and their use in improving bandwidth, speed and accuracy in active networks
[AD-A159819] N86-17619

AMPLIFIERS
Design and performance of large area monolithic electron guns for the Aurora KrF laser system
[DE85-014112] N86-17734

AMPLITUDE MODULATION
A model for the analysis of orthogonal modulation methods for digital transmission
[FI-445-TBR-23] N86-17602

ANALOG DATA
Analogue SAR signal processing: Architecture and technology
[REPT-3881-ISSUE-1-VOL-2] N86-17601

ANALOG TO DIGITAL CONVERTERS
Analog to digital (A/D) conversion at the Metsaehovi (Finland) Radio Research Station N86-18266

ANALYSIS OF VARIANCE
Uncorrelated noise in turbulence measurements
[PB85-212314] N86-17968

ANALYTIC FUNCTIONS
On the holomorphic continuation of the Iwasawa and a related decomposition
[CWI-PM-R8502] N86-18077

ANGLE OF ATTACK
Numerical analysis about flow over an aerofoil with a large angle of attack N86-17291
An experimental investigation of supersonic flow over axisymmetric afterbodies with a centered propulsive jet at angles of attack
[FFA-TN-1985-10] N86-17317

ANGULAR DISTRIBUTION
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211
Comment on an unusual event in the E594 detector from the direction of Cygnus X-3
[DE85-018341] N86-18278

ANGULAR MOMENTUM
Analysis of the unbalanced NBI rotation experiments in the ISX-B, PLT and PDX Tokamaks
[DE85-017616] N86-18193

ANGULAR RESOLUTION
Comment on an unusual event in the E594 detector from the direction of Cygnus X-3
[DE85-018341] N86-18278

ANISOTROPY
A study of the spiraphase and anisotropic substrates in microstrip antennas
[AD-A159862] N86-17597
The mechanics of a near-surface crack under uniform pressure or shear in a transversely isotropic medium: With applications to hydraulic fracture N86-17780

ANNEALING
Burst annealing of electron damage in silicon solar cells N86-17853

ANNIHILATION REACTIONS
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
Large-t elastic scattering and diffraction dissociation
[NIKHEF-H/85-4] N86-18163

ANNUAL VARIATIONS
Acid Deposition System (ADS) data base, data summary procedures and statistical reporting of spatial patterns and trends
[DE85-017910] N86-17907
Oxygen-18 study of the atmospheric-aquatic linkage in three Adirondack lake watersheds
[DE85-018355] N86-17912

ANNULAR FLOW
Numerical flow analysis for axial flow turbine N86-17281
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282

ANNULAR NOZZLES
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282

ANODES
Gated strip proportional detector
[DE85-017757] N86-17708
Position sensitive gas counter readout system
[DE85-017953] N86-17713

ANOMALIES
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures N86-17771
Lorentz anomaly in arbitrary dimensions
[DE86-001332] N86-18116

ANTARCTIC REGIONS
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817

ANTENNA ARRAYS
MMIC antenna technology development in the 30/20 gigahertz band
[NASA-TM-87192] N86-17368
Array positioning requirements
[AD-A159866] N86-18124

ANTENNAS
A study of the spiraphase and anisotropic substrates in microstrip antennas
[AD-A159862] N86-17597
USSR report: Electronics and electrical engineering
[JPRS-UEE-84-016] N86-17640
Antenna analysis and boundary conditions for Alfven wave studies in tokamaks
[DE85-018011] N86-18196

ANTHROPOMETRY
Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
[MBL-1985-6] N86-17980
A Computer Aided Design (CAD) system as a tool for the ergonomist in developing man-machine systems
[IZF-1985-10] N86-17993

ANTIPROTONS
Large-t elastic scattering and diffraction dissociation
[NIKHEF-H/85-4] N86-18163

ANTIREFLECTION COATINGS
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880

Laser-assisted solar cell metallization processing
[NASA-CR-176457] N86-17883

ANTISUBMARINE WARFARE
Stochastic measurements and systems implications
[AD-A159827] N86-18122

APERTURES
Apparatus for laser beam profile measurements
[DE85-017789] N86-17740

APPROXIMATION
Wave propagation in thick damped laminated plates
[AASU-344] N86-17787

AQUEOUS SOLUTIONS
Method for improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system
[DE85-017723] N86-17978

ARC JET ENGINES
Analysis of electric propulsion concepts for near-term mission application N86-17424
Thermal arcjet technology for space propulsion N86-17427

ARC MELTING
Vacuum arc remelting: An overview
[DE85-016458] N86-17751

ARC WELDING
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769
Design for a path control algorithm of a robot arm with external sensor control N86-18057

ARCHAEOLOGY
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815

ARCHITECTURE
Activities report in applied physics N86-18119

ARCHITECTURE (COMPUTERS)
Image processor architectures and a data-driven image processore: TIP-1 N86-17287
Partitioning problems in parallel, pipelined and distributed computing
[NASA-CR-178023] N86-17997
Research in computer science
[NASA-CR-176486] N86-17998
Novel computer architectures for data storage and retrieval
[BLRDR-5845] N86-18005
ORION: An interactive color post-processor for two dimensional finite element codes, revision 2
[DE85-017876] N86-18021
The scenario test driver for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-55/85] N86-18044

ARCTIC REGIONS
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017875] N86-17956

ARGON
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472

ARITHMETIC
Implementation of a new primality test --- prime numbers
[CWI-CS-R8505] N86-18093

ARMED FORCES (UNITED STATES)
Future Air Force space power needs N86-17840

ARRAYS
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
Development of an accurate algorithm for exp(Bt)
[AD-A160060] N86-18015
Direction of arrival estimation of eigenstructure methods with unknown sensor gain and phase
[AD-A160027] N86-18065
Array positioning requirements
[AD-A159866] N86-18124

ARTERIOSCLEROSIS
A comparison of postmortem coronary atherosclerosis findings in general aviation pilot fatalities
[AD-A159811] N86-17982

ARTIFICIAL INTELLIGENCE
Notes on logic --- artificial intelligence
[NPL-DITC-65/1985] N86-18051
A combination of artificial intelligence and procedural language programs in a computer application system supporting nuclear reactor operations
[DE85-007937] N86-18052
Databases and automated reasoning
[DE85-018348] N86-18247

ASSEMBLING
Multi-port valve assembly
[DE85-017769] N86-17753
Assembling with use of permanent deformation
[CETIM-13-N-283] N86-17812

ASSESSMENTS
Noise assessment around Schiphol airport (the Netherlands) in 1981
[NLR-TR-82034-U] N86-17915
Noise assessment around Rotterdam airport (the Netherlands) in 1981
[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

ASSURANCE
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354

ASTROMETRY
Ad astra HIPPARCOS. The European Space Agency's astrometry mission
[ESA-BR-24] N86-18282

ASTRONOMICAL OBSERVATORIES
South African Astronomical Observatory Circular No. 9
[SAAOC-9] N86-18271

ASTROPHYSICS
Activities report in space research in Norway
[SAD-125-T] N86-17361
Nuclear astrophysics away from stability
[DE85-018188] N86-18281

ASYMMETRY
Design of nonaxysymmetric structures (turbojet engine nacelle element)
[SNIAS-852-430-119] N86-17498

ASYMPTOTIC METHODS
A study of high Reynolds number laminar separation N86-17302
Modified confidence intervals for the mean of an autoregressive process
[AD-A160055] N86-18107
On the asymptotic properties of a kernel-type quantile estimator from censored samples
[AD-A160302] N86-18108

ASYMPTOTIC PROPERTIES
On the numerical evaluation of Bessel functions of first, second and third kind of complex argument and integer orders
[MEAH-54] N86-18097

ASYNCHRONOUS MOTORS
Digital structure of an autopiloting for asynchronous machine fed by Pulse Width Modulation (PWM) converter N86-17438

ATMOSPHERIC ATTENUATION
Some aspects of the atmospheric radiance model of LOWTRAN 6
[DFVLR-FB-85-33] N86-17945

ATMOSPHERIC BOUNDARY LAYER
Pollutant dispersal --- air pollution, conference
[VKI-LS-1985-02] N86-17895
Atmospheric boundary layer modeling N86-17896
Application of linked three-dimensional Planetary Boundary Layer (PBL) and dispersion models to New York City --- air pollution N86-17904
Hanford 1984 atmospheric boundary layer experiment: Micrometeorological and tracer data archive. Set 002 documentation report
[PB85-243145] N86-17963

ATMOSPHERIC CHEMISTRY
The Earth's atmosphere: Ideas old and new
[RAE-TM-SPACE-351] N86-17931

ATMOSPHERIC CIRCULATION
Atmospheric fates of organic chemicals: Prediction of ozone and hydroxyl radical reaction rates and mechanisms
[PB85-241529] N86-17927
A program for International Polar Oceans Research (PIPOR)
[ESA-SP-1074] N86-17972

ATMOSPHERIC DENSITY
National Geophysical Data Center
[PB85-248458] N86-17947

ATMOSPHERIC DIFFUSION
Fluctuating wind effects --- air pollution - pollution dispersal N86-17900
Atmospheric dispersion models and their limitations
[TI85-018522] N86-17905
Measuring the electric field in the atmosphere in connection with investigations on the dispersion of air pollution
[S/T-REPT-VOL-2-NO-10] N86-17924

ATMOSPHERIC EFFECTS
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

ATMOSPHERIC ELECTRICITY
Measuring the electric field in the atmosphere in connection with investigations on the dispersion of air pollution
[S/T-REPT-VOL-2-NO-10] N86-17924

ATMOSPHERIC LASERS
Evaluation of data obtained from atmospheric laser Doppler velocimeter
[NASA-CR-178474] N86-17703

ATMOSPHERIC MODELS
Wind turbulence input model for horizontal axis wind turbines N86-17303
Development of a two-scale turbulence model and its application N86-17662
Pollutant dispersal --- air pollution, conference
[VKI-LS-1985-02] N86-17895
Atmospheric boundary layer modeling N86-17896
Sensitivity, applicability and validation of bi-Gaussian off- and on-line models for the evaluation of the consequences of accidental releases in nuclear facilities --- air pollution
[EUR-9385-EN] N86-17897
Numerical techniques and dispersion modeling --- air pollution N86-17898
Dispersion of heavy gases N86-17899
Lagrangian modeling of turbulent dispersion --- air pollution N86-17901
Fluid modeling of flow and dispersion in the atmosphere: Facilities and techniques --- air pollution N86-17902
Fluid modeling of flow and dispersion in the atmosphere: Historical notes N86-17903
Application of linked three-dimensional Planetary Boundary Layer (PBL) and dispersion models to New York City --- air pollution N86-17904
Atmospheric dispersion models and their limitations
[TI85-018522] N86-17905
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913
Deposition of sulfur in Europe: Methods to construct unbiased source-receptor matrices from data of a limited period (1976 - 1982). A meteorological contribution to the IIASA Regional Acidification Information and Simulation (RAINS) model
[KNMI-TR-66] N86-17923
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017875] N86-17956
Natural Phenomena Hazards Modeling Project. Extreme wind/tornado hazard models for Department of Energy sites. Revision 1
[DE85-018156] N86-17957

ATMOSPHERIC MOISTURE
Influence of corrosion pits and environmental moisture on the fatigue behavior of 35 NCD 16 THR-ESR
[M3-450900] N86-17555

ATMOSPHERIC OPTICS
The Smoke Transmission and Reflection Threshold (START) model; the Oldebroek (Netherlands) 2 trials, May 1981
[IZF-1984-22] N86-18187

ATMOSPHERIC PHYSICS
The Earth's atmosphere: Ideas old and new
[RAE-TM-SPACE-351] N86-17931

ATMOSPHERIC PRESSURE
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951

ATMOSPHERIC REFRACTION
A CO2 laser scintillometer for C(2) sub n measurements over a many kilometer path
[KNMI-TR-67] N86-17743

ATMOSPHERIC SCATTERING
A method for estimating atmospheric stability using sodar measurements --- in diffusion control at nuclear power plants
[FOA-E-40020] N86-17944

ATMOSPHERIC SOUNDING
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
ATMOSPHERIC TURBULENCE
Wind turbulence input model for horizontal axis wind turbines N86-17303
Critical analysis of turbulence restitution from acceleration measurements --- aircraft construction
[ONERA-RT-3/3567-RY-C40-R] N86-17340
ATOMIC BEAMS
Simultaneous measurement of current and plasma density profiles in the TEXT Tokamak
[DE85-017679] N86-18200
ATOMIC COLLISIONS
Investigation of the formation, ionization, and collision dynamics of microclusters using scattering analysis
[MPIS-6/1985] N86-18161
Investigations of the interaction between Na(3P) and K(4S) using measurements of the differential scattering cross section
[MPIS-7/1985] N86-18162
ATOMIC ENERGY LEVELS
Theoretical studies of Resonance Enhance Stimulated Raman Scattering (RESRS) of frequency doubled Alexandrite laser wavelengths in cesium vapor
[NASA-CR-176464] N86-17731
Absolute wavelength measurement and fine structure determination in (7)Li 2
[DE85-018382] N86-18235
ATOMIC PHYSICS
Activities report in fundamental research on matter (FOM) N86-18118
ATOMIC SPECTRA
Systematic view of optical absorption spectra in the actinide series
[DE85-018406] N86-18225
ATOMIC STRUCTURE
Structural phase transition in CeCu6
[DE85-018362] N86-18223
ATOMS
Laser spectroscopy of sputtered atoms
[DE85-018388] N86-17517
ATTENUATION
Area coverage of radio networks: Method description and propagation measurements in urban area
[FOA-C-30397-E2] N86-17612
ATTITUDE (INCLINATION)
Determining spatial orientation of axes of elliptical magnetic field N86-17652
ATTITUDE CONTROL
Compensating structure and parameter optimization for attitude control of a flexible spacecraft
[INPE-3564-PRE/770] N86-17371
AUDIO EQUIPMENT
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704
AUDIOLOGY
Activities report of the Institute of Sound and Vibration Research N86-17685
AUDITORY SENSATION AREAS
Visualisations of speech based on a model of the peripheral auditory system
[NPL-DITC-62/85] N86-17593
AUDITORY SIGNALS
Visualisations of speech based on a model of the peripheral auditory system
[NPL-DITC-62/85] N86-17593
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704
AURORAL ARCS
Boundary layer plasmas as a source for high-latitude, early afternoon, auroral arcs
[KGI-PREPRINT-079] N86-17943
AUSTENITE
Hyperfine fields in Fe-Ni-X alloys and their application to a study of tempering of 9Ni steel
[DE85-011517] N86-17538
AUSTENITIC STAINLESS STEELS
High strain rate deformation in FCC metals and alloys
[DE85-017533] N86-17536
Estimation of flaw size in ultrasonic testing of welds in unalloyed and low-alloy steels
[BLL-RISLEY-TR-5229-(9091.9F)] N86-17782
AUTOMATIC CONTROL
A device for computer-controlled potential modulation in electrochemical Fourier transform infrared spectroscopy
[AD-A159826] N86-17620
Tool wear monitoring systems
[CETIM-100560] N86-17761
Computers at the Metsaehovi (Finland) radio research station N86-18265
AUTOMATIC FLIGHT CONTROL
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329
AUTOMATIC TEST EQUIPMENT
Automatic crack length measurements by the electrical potential drop method with computer control
[VTH-LR-309] N86-17805
An automated charge monitoring system for the NPL linear accelerator
[NPL-RS(EXT)80] N86-18136
AUTOMATIC WEATHER STATIONS
Installation of automated weather observing systems by FAA (Federal Aviation Administration) at commercial airports is not justified
[PB85-241347] N86-17964
AUTOMOBILES
Beam steerable microwave antenna for automotive radar application N86-17591
Hybrid gas/electric vehicle
[DE85-016736] N86-18254
AUTOPSIES
A comparison of postmortem coronary atherosclerosis findings in general aviation pilot fatalities
[AD-A159811] N86-17982
AUTORADIOGRAPHY
Shape and depth of the crystallisation front in steel ingots remelted by the electroslag method determined with the aid of radioactive phosphorus
[BLL-DRIC-T-TR-7561-(3623.66)] N86-17525
AUTOROTATION
Estimation of drag due to inoperative turbo-jet and turbo-fan engines using data item nos. 81009 and 84004
[ESDU-84005] N86-17305
AUXILIARY PROPULSION
LOX/LH2 vane pump for auxiliary propulsion systems N86-17397
AVIONICS
Error propagation in a digital avionic processor: A simulation-based study
[NASA-CR-176501] N86-17351
Development of a piezoelectric quartz pressure sensor for avionics with excellent long term stability (with final demonstration of the results on a prototype)
[BMFT-FB-W-85-010] N86-17353
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354
AXES OF ROTATION
Determining spatial orientation of axes of elliptical magnetic field N86-17652
AXIAL FLOW
Free vibrations of finite flexible shells and tubes in axial flow N86-17804
AXIAL FLOW TURBINES
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
Numerical flow analysis for axial flow turbine N86-17281
AXISYMMETRIC BODIES
Supersonic flow on axisymmetric blunt body N86-17268
AXISYMMETRIC FLOW
An experimental investigation of supersonic flow over axisymmetric afterbodies with a centered propulsive jet at angles of attack
[FFA-TN-1985-10] N86-17317
Development of a Two-Dimensional/Axisymmetric implicit Navier-Stokes solver using flux-difference splitting concepts and fully general geometry
[AD-A159776] N86-17667
AZOLES
Polynuclear pyrazolyl-bridged spiro species containing boron and metal centers
[AD-A159847] N86-17569

B

BACKGROUND NOISE
Speech processing for intelligibility improvement
[IZF-1985-14] N86-17610
BACKGROUND RADIATION
Method of measuring emittance of thermal insulation materials at low temperatures N86-17650
Red shift radiation: A major electromagnetic radiation measurement N86-18270
Preliminary results of the study of ultraviolet background with IUE
[PREPRINT-447] N86-18279
BACKSCATTERING
Inverse Faraday effect in hemoglobin detected by Raman spectroscopy: An example of magnetic resonance Raman activity
[AD-A159806] N86-17975
BANDWIDTH
Review of high bandwidth fiber optics radiation sensors
[DE85-017559] N86-18183
BARIUM COMPOUNDS
Impregnant composition in dispenser cathodes
[AD-A160044] N86-17622
BARIUM SULFIDES
Rhombohedral-to-triclinic phase transition in BaMo6S8
[DE85-018450] N86-18232
BAYES THEOREM
Random parameter Markov population process models and their likelihood, bayes and empirical bayes analysis
[AD-A159812] N86-18102
BEAM INTERACTIONS
Low level RF system for the Fermilab Tevatron
[DE85-017440] N86-18166
BEAMS (RADIATION)
The scattering of Gaussian beams incident on a transmitting layer configuration N86-17589
Collective effects and lattice implications for an FEL bypass ring
[DE85-016563] N86-17735
Apparatus for laser beam profile measurements
[DE85-017789] N86-17740
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
New and old accelerators: What can they do for astrophysics
[DE85-013220] N86-18165
Programmable high power beam damper for the Tevatron
[DE85-017441] N86-18167
BEAMS (SUPPORTS)
Application of surface acoustic wave resonators to quartz bending beams as integrated dilation recorders in balances (load cells)
[BMFT-FB-T-85-058] N86-17803
BENDING
Collective effects and lattice implications for an FEL bypass ring
[DE85-016563] N86-17735
BENDING VIBRATION
Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects
[NASA-TM-87207] N86-17789
BENZENE
Ultraviolet laser-induced photocondensation in the benzol vapor phase
[MPIS-4/1985] N86-17520
BERYLLIUM
Thermal shock behavior of beryllium limiters in Tokamak fusion devices
[DE85-017815] N86-18195
BESSEL FUNCTIONS
Subroutine package for Bessel functions of a complex argument and nonnegative order
[DE86-000047] N86-18071
On the numerical evaluation of Bessel functions of first, second and third kind of complex argument and integer orders
[MEAH-54] N86-18097
BETA PARTICLES
An intercomparison of measurements of the beta spectra of 90Sr-90Y
[NPL-RS(EXT)77] N86-18134
Neutrinoless double beta decay and multiquark states in nuclei
[PREPRINT-449] N86-18159
BETATRONS
Programmable high power beam damper for the Tevatron
[DE85-017441] N86-18167
BIBLIOGRAPHIES
Robotic deburring: A bibliography
[DE85-015760] N86-17750
NDE (Non-Destructive Evaluation) publications, 1982
[PB85-244069] N86-17776
Bibliography of research on ocean fronts, 1964-1984
[AD-A160040] N86-17970
Bibliographic post-processing with the TIS Intelligent Gateway: Analytical and communication capabilities
[DE85-018153] N86-18245
BIOASSAY
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981

BIOLOGICAL EFFECTS
Bio-Observation Subsystem (BOSS) feasibility study --- Spacelab
[BOSS-010-MT] N86-17362
Bio-observation subsystem, phase A study, executive summary --- Spacelab
[REPT-648-DT-6-ISSUE-1] N86-17364
BIOLOGICAL MODELS (MATHEMATICS)
Simple method for the determination of regional daily evapotranspiration of crops using remote sensing
[NOTA-1580] N86-17832
The biomorphic model of the human pilot
[VTH-LR-310] N86-17991
BIOMASS
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterscheide (the Netherlands)
[MDLK-R-8509] N86-17722
BIOTECHNOLOGY
Sample selection and testing of separation processes
[NASA-CR-176569] N86-17502
BIT SYNCHRONIZATION
Time-driven algorithms for distributed control --- computer networks
[CWI-CS-R8510] N86-18037
BL LACERTAE OBJECTS
Observations of extragalactic radio sources at 8 and 13.5 mm N86-18269
BLANKETS (FUSION REACTORS)
Detailed design of a 13 kA 13 kV dc solid-state turn-off-switch
[DE85-013874] N86-17623
BLEACHING
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568
BLUFF BODIES
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304
BLUNT BODIES
Supersonic flow on axisymmetric blunt body N86-17268
BO-105 HELICOPTER
Construction of a measuring method using fiber optics and an LTN-90 laser gyro strapdown system for BO-195 helicopters
[DFVLR-MITT-85-10] N86-17333
BODY-WING CONFIGURATIONS
Transonic wind tunnel tests of a swept supercritical wing-body model, PT 8
[FFA-TN-1982-24] N86-17316
BOILING
A two-dimensional model for boiling in an active particle bed: BOIL
[VKI-TN-153] N86-17681
BONDING
Use of peel values in structural analysis N86-17394
Chemically bonded ceramic materials for use in thermal energy storage devices
[DE85-018078] N86-17572
BOOSTER ROCKET ENGINES
Oxygen/hydrocarbon combustion devices technology N86-17407
BORIDES
The boriding of refractory metals
[BLL-BISI-23037-(9022.060)] N86-17527
BORN APPROXIMATION
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123
BORON
Influence of boron on dendrite structure of cast metal
[BLL-M-36491-(5828.4)] N86-17523
Recent developments concerning segregation and fracture at grain boundaries
[DE85-018106] N86-17547
BORON CARBIDES
The boriding of refractory metals
[BLL-BISI-23037-(9022.060)] N86-17527
BORON COMPOUNDS
Polynuclear pyrazolyl-bridged spiro species containing boron and metal centers
[AD-A159847] N86-17569
BORON NITRIDES
High speed steel working tools --- milling
[CETIM-102360] N86-17762
BORON REINFORCED MATERIALS
The boriding of refractory metals
[BLL-BISI-23037-(9022.060)] N86-17527
BOUNDARY INTEGRAL METHOD
Formulation of a one-dimensional boundary integral equation for three-dimensional elastostatic corner problems
[PREPRINT-886] N86-18083
BOUNDARY LAYER FLOW
Response of viscoelastic slab to viscous slab to viscous fluid flow N86-17657
Investigation of an oblique shock wave/laminar boundary layer interaction using Laser Doppler Velocimetry (LDV)
[VKI-TN-152] N86-17680
Progress in the development of a two-fluid model of turbulence for near-wall flows. Part 2: Heat-transfer characteristics of a boundary layer
[CFD/84/8-PT-2] N86-17686
The numerical calculation of particle-size distributions in 2D jets and boundary layers
[CFD/85/6] N86-17688
BOUNDARY LAYER PLASMAS
Boundary layer plasmas as a source for high-latitude, early afternoon, auroral arcs
[KGI-PREPRINT-079] N86-17943
BOUNDARY LAYER SEPARATION
Boundary layer calculations on the leeward surface of a slender delta wing at incidence
[NLR-TR-84001-U] N86-17700
BOUNDARY LAYER TRANSITION
Recent experience in the RAE 5 meter wind tunnel of a china clay method for indicating boundary layer transition
[RAE-TM-AERO-2007] N86-17306
BOUNDARY LAYERS
Low Reynold's number boundary layers in a disturbed environment
[NASA-CR-175031] N86-17665
BOUNDARY VALUE PROBLEMS
Upsetting of viscoplastic medium between two rigid plates in presence of friction
[BLL-M-36390-(5828.4)] N86-17745
The mechanics of a near-surface crack under uniform pressure or shear in a transversely isotropic medium: With applications to hydraulic fracture N86-17780
Harmonic analysis and partial differential equations
[CTH-MATH-1985-03] N86-18062
Dirichlet problem for Lipschitz domain. The setup N86-18063
Recent progress on boundary value problems on Lipschitz domains
[MATH-REPT-84-133] N86-18064
A study of the back-and-forth shooting method --- boundary value problems
[REPT-A-3] N86-18073
Convergence and order reduction of diagonally implicit Runge-Kutta schemes in the method of lines
[CWI-NM-R8506] N86-18089
Predictor-corrector methods for periodic second-order initial value problems
[CWI-NM-R8509] N86-18090
A difference procedure to solve quasilinear plasma physics parabolic systems
[PREPRINT-892] N86-18204
BOX BEAMS
Design and fabrication of an advanced composite cellular wing box
[VTH-LR-315] N86-17344
BRANCHING (MATHEMATICS)
Bifurcation and stability, a numerical approach
[NLR-MP-84078-U] N86-18085
An introductory comparative study of the Hopf bifurcation method and the Dee harmonic balance method
[LAB-REPT-757] N86-18113
BRANCHING (PHYSICS)
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
BRAYTON CYCLE
Numerical study of the performance of latent heat storage for solar dynamic power systems
[DE85-018101] N86-17884
BREADBOARD MODELS
Breadboard development of a hydraulically coupled free piston engine heat pump compressor
[DE85-005242] N86-17874
BREATHING APPARATUS
Psychological problems associated with the wearing of respiratory protective devices: A review
[FOA-C-40216-C2] N86-17995
BRIDGES (STRUCTURES)
Vibrational stability behaviour of orthotropic plates in steel roads bridges: Application for financial support of a research project by the ECSC (European Coal and Steel Community)
[BLL-TRANS-3225-(9057.2451)] N86-17778
BRIGHTNESS
Brightness measurements on the Livermore high brightness test stand
[DE86-000016] N86-18157
Determination of spectral distributions and instrumental magnitudes of planets
[ESA-STR-214] N86-18280
BROADCASTING
USSR report: Electronics and electrical engineering
[JPRS-UEE-84-016] N86-17640
BRONZES
The corrosion properties of aluminum bronzes: A literature review
[KIS-1985-3E] N86-17532
BROWNIAN MOVEMENTS
Brownian motion
[AD-A160020] N86-18103
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
BUBBLE CHAMBERS
The NA27 trigger --- proton beam bubble chamber experiment (NA27)
[USIP-85-10] N86-18172
Treatment of strange particle decays observed in the UA5 streamer chambers
[USIP-85-16] N86-18175
BUBBLES
A theoretical and experimental study of noncondensible turbulent bubbly jets N86-17661
BUCKLING
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801
BUMPY TORUSES
Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device
[DE85-018139] N86-18190
BURNERS
A basic computer code for industrial burner designs. Part 1: Capability test in isothermal swirling flows N86-17284
BURNING RATE
Improved space motor demonstration N86-17413
Analysis of a gas generator system
[AD-A156999] N86-17749
BUS CONDUCTORS
Alternating current buses for low Earth orbits: A viable alternative N86-17435
Influence of the bus regulation on telecommunication spacecraft power system and distribution N86-17467
BUTADIENE
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501
BYPASSES
Time domain analysis of an S3R system --- sequential switching shunt regulator (S3R) N86-17463

C

CALCIUM COMPOUNDS
Impregnant composition in dispenser cathodes
[AD-A160044] N86-17622
The red band spectrum of gaseous CaH. Molecular equilibrium ground state constants. Term values of the A(2)Pi, B(2)Sigma, and X(2)Sigma states
[USIP-85-13] N86-18164
CALIBRATING
Liquid flow calibration --- hydraulic equipment
[CETIM-15-C-251] N86-17691
Test of a measuring instrument composed of two local flow turbines, two drag bodies, a full flow turbine and a two-beam densitometer, of the Large Pressurized Water Reactor Offnormal Behavior Investigation (LOBI) instrumentation in a transient two-phase flow
[KFK-3877] N86-17694
Temperature fixed points. 1: Possible devices in the range 0 to 125 C
[NPL-QU-70] N86-17701
A smoke generator for the absolute calibration of gas turbine engine smoke sampling and measuring systems
[RAE-TM-P-1044] N86-17702
Spectroradiometric calibration of the Thematic Mapper and multispectral scanner system
[E86-10022] N86-17816
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115
CAMS
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748

CAPILLARY TUBES
Study on the measuring of polymer rheological properties by adapting an injection molding machine
[CETIM-5-650-06] N86-17574
CARBAMATES (TRADENAME)
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
CARBON DIOXIDE
Corrosion of metals by hydrazine N86-17395
CARBON DIOXIDE LASERS
A CO2 laser scintillometer for C(2) sub n measurements over a many kilometer path
[KNMI-TR-67] N86-17743
CARBON FIBER REINFORCED PLASTICS
Design and fabrication of an advanced composite cellular wing box
[VTH-LR-315] N86-17344
A review of the physical ageing of epoxy resins and their carbon fibre composites
[RAE-TM-1051(MAT/STR)] N86-17473
Effect of carbon fiber surface treatment on moisture absorption and interlaminar shear strength of carbon fibre/epoxy resin composites
[RAE-TR-84047] N86-17474
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites
[OUEL-1579/85] N86-17481
Study of composite material curing molds
[DGT-26.817] N86-17486
Statistics on the basic characteristics of carbon epoxy composites
[DGT-27.039] N86-17487
Elementary characterization of the Rigidite 5245C/IM6 preimpregnated carbon from NARMCO U.S., test report M3-449000, part 2
[PV-M3-449000-PT-2] N86-17489
High pressure gas storage tanks: A compromise between safety regulations and performances
[SNIAS-852-430-115] N86-17768
CARBON FIBERS
Reduction of aliphatic nitrocompounds on nonoxidised and oxidised carbon fibre electrodes
[BR97661] N86-17471
Electrochemical behavior of graphite fiber-polymer composites
[AD-A160031] N86-17478
The use of ultrasonic wave attenuation to monitor polymer and composite quality
[AERE-R-11704] N86-17777
CARBON MONOXIDE
Photodecomposition of Mo(CO)6 adsorbed on Si(100)
[DE85-017818] N86-17510
CARBON STARS
Photometry of R Coronae Borealis and hydrogen-deficient carbon stars, 1982-3 N86-18275
CARBON STEELS
Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799
CARBON 14
ABC's of pion charge exchange
[DE85-017531] N86-18155
CARBON-CARBON COMPOSITES
Low cost carbon/carbon nozzles for solid rocket motors N86-17381
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
CARBONIC ACID
Effects of acid rain on forest nutrient status
[DE85-018120] N86-17911
CARBONYL COMPOUNDS
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
CARCINOGENS
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981
CARNOT CYCLE
Experimental results on a low-temperature magnetic refrigerator
[DE85-017541] N86-17583
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236
CASCADE FLOW
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment N86-17278
Numerical analysis of fully three-dimensional flow in transonic turbine cascades N86-17279
Numerical flow analysis for axial flow turbine N86-17281
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282
A study of high Reynolds number laminar separation N86-17302
CASSEGRAIN OPTICS
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
CAST ALLOYS
Influence of boron on dendrite structure of cast metal
[BLL-M-36491-(5828.4)] N86-17523
CASTING
Vacuum arc remelting: An overview
[DE85-016458] N86-17751
CATALOGS (PUBLICATIONS)
Publications, catalog 1985 N86-18249
Films, catalog 1985 --- aerospace N86-18250
CATALYSIS
Reaction enhancement of heterogeneously catalyzed reactions by concentration forcing
[DE86-000220] N86-17514
Influence of catalytic additions on ferric-oxide reduction
[BLL-BISI-23009-(9022.060)] N86-17526
CATALYSTS
On recovery of platinum from spent catalysts
[CE-TRANS-8042] N86-17499
Low temperature methanol synthesis catalyst and process development
[DE85-017837] N86-17511
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
Catalytic reactivity of thin crystal surfaces
[DE85-018293] N86-18228
CATALYTIC ACTIVITY
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
CATHODES
Impregnant composition in dispenser cathodes
[AD-A160044] N86-17622
Gated strip proportional detector
[DE85-017757] N86-17708
Design and performance of large area monolithic electron guns for the Aurora KrF laser system
[DE85-014112] N86-17734
CAUSTICS (OPTICS)
The use of acoustical caustics in fracture mechanics N86-17781
CAVITIES
Laminar flow in a driven square cavity
[PDR/CFDU/IC/17] N86-17689
CDC CYBER 205 COMPUTER
The use of vector computers in aerodynamic computations
[NLR-MP-84051-U] N86-18031
CEILINGS (METEOROLOGY)
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951
Limited surface observations climatic summary LISOCS. Gilze-Rijen, Netherlands
[AD-A159863] N86-17952
Revised Uniform Summary of Surface Weather Observations, Pease AFB, New Hampshire
[AD-A159865] N86-17954
CELLS (BIOLOGY)
Sample selection and testing of separation processes
[NASA-CR-176569] N86-17502
Clonal analysis of HLA-DR and -dQ associated determinants: Their contribution to dw specificities
[AD-A160059] N86-17977
CEMENTS
International Symposium on Mechanical Properties of Special Concrete
[PB85-234961] N86-17770
CENTAUR LAUNCH VEHICLE
The O sub 2/H sub 2 propulsion module for planetary spacecraft injection energy augmentation N86-17422
CENTER OF PRESSURE
Close-in characteristics of LH2/LOX reactions N86-17410
CENTRAL PROCESSING UNITS
Error propagation in a digital avionic processor: A simulation-based study
[NASA-CR-176501] N86-17351
CENTRIFUGING
Sample selection and testing of separation processes
[NASA-CR-176569] N86-17502
CEPHEID VARIABLES
Photometry and radial velocities of 27 southern galactic Cepheids N86-18273
CCD photometry of galactic clusters containing Cepheid variables. Paper 3: Photometry and identification charts for NGC 6067 N86-18276
CERAMIC MATRIX COMPOSITES
Ceramic composites made by sol-gel processing
[SNIAS-852-430-103] N86-17491
Ceramic fiber composites: Manufacturing and performances
[SNIAS-852-430-118] N86-17497
CERAMICS
A concept for the quality assurance of ceramic gas turbine components using nondestructive tests
[BMFT-FB-T-85-094] N86-17773
CERIUM
Structural phase transition in CeCu6
[DE85-018362] N86-18223
CERTIFICATION
Hardware/software Failure Mode Effect Analysis (FMEA) applied to airplane safety
[NLR-MP-84073-U] N86-17325
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354
CESIUM VAPOR
Theoretical studies of Resonance Enhance Stimulated Raman Scattering (RESRS) of frequency doubled Alexandrite laser wavelengths in cesium vapor
[NASA-CR-176464] N86-17731
CHAINS
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
CHANNELS (DATA TRANSMISSION)
Channel coding with the (255, 255-2T) Reed-Solomon codes over CF (256)
[NLR-TR-83149-U] N86-18042
CHARACTERIZATION
Physical chemical characterization tests of the 5245C NARMCO preimpregnation resin, test report M3-449000, part 1 --- carbon fiber impregnation
[PV-M3-449000-PT-1] N86-17490
Metallurgical and assembling fatigue characterization of the alloys 2214T451, 7010T73651 and 2024T351 in plates (50 to 70 mm, 120 to 125 mm) and in thick forged bars
[DGT-25.919] N86-17552
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000406] N86-17937
Northeastern regional geologic characterization report. Volume 3: Plates
[DE86-000418] N86-17938
North Central regional geologic characterization report. Volume 2: Plates
[DE86-000419] N86-17939
Characterization of the electromagnetic radiation preceding lightning
[ONERA-NT-1985-1] N86-17960
CHARGE CARRIERS
The nature of charge carriers in electrorheological suspensions
[BR97662] N86-17500
CHARGE COUPLED DEVICES
Improved blue response CCD-MA357 detectors --- spaceborne imaging
[GEC-16,879C] N86-17718
Electro-optical aerial reconnaissance camera: An experimental system used in a simulated reconnaissance environment
[FOA-C-30394-E1] N86-17719
CHARGE DISTRIBUTION
Radiation damage in high-resistivity silicon solar cells N86-17856
CHARGE EXCHANGE
ABC's of pion charge exchange
[DE85-017531] N86-18155
CHARGE TRANSFER DEVICES
Microelectronic image sensors: A report from the Charge Transfer Device (CTD) team at FOA 3
[FOA-C-30391-E1,E3] N86-17631
CHARGED PARTICLES
Effect of charge and aerodynamic properties of particles on electrified fabric filtration
[DE86-000013] N86-17628
Difficulties with inferring neutron cross sections from charged-particle reactions
[DE86-000020] N86-18149
CHARM (PARTICLE PHYSICS)
Indiana University High Energy Physics Group
[DE85-012000] N86-18169
CHEMICAL ANALYSIS
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
Influence of a large sulfur dioxide point source on mesoscale rainwater chemistry
[DE85-018215] N86-17908

Protein mapping and the problem of complexity in molecular biology
[DE85-018349] N86-17979

CHEMICAL BONDS
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds
[DE85-017094] N86-17505

CHEMICAL CLOUDS
Assessment of the performance of an in-field Gaussian plume/puff model for overwater use
[AD-A160032] N86-17955

CHEMICAL COMPOSITION
Survey of chemical speciation of trace elements using synchrotron radiation
[DE85-017850] N86-17516
Influence of a large sulfur dioxide point source on mesoscale rainwater chemistry
[DE85-018215] N86-17908

CHEMICAL EXPLOSIONS
Close-in characteristics of LH2/LOX reactions N86-17410

CHEMICAL PROPERTIES
Chemical and microstructural effects on the diffusional creep behaviour of AISI type 316 stainless steel
[AERE-R-11322] N86-17563
Chemical characterization of polyethylene resins and polyethylene gas pipe
[DE85-018346] N86-17573
Physical and chemical characterization of multilayered structures
[DE85-016922] N86-17624

CHEMICAL PROPULSION
Microwave electric propulsion for orbit transfer applications N86-17429

CHEMICAL REACTION CONTROL
Plutonium(4) hydrous polymer chemistry
[DE85-016594] N86-17570

CHEMICAL REACTIONS
Atmospheric fates of organic chemicals: Prediction of ozone and hydroxyl radical reaction rates and mechanisms
[PB85-241529] N86-17927
Bibliography of research on ocean fronts, 1964-1984
[AD-A160040] N86-17970

CHEMICAL REACTORS
Low temperature methanol synthesis catalyst and process development
[DE85-017837] N86-17511
Reaction enhancement of heterogeneously catalyzed reactions by concentration forcing
[DE86-000220] N86-17514

CHILE
Tsunamis in Peru-Chile
[PB85-247815] N86-17973

CHIRAL DYNAMICS
Chiral symmetry on the lattice with Wilson fermions
[PREPRINT-452] N86-18080
Nonlinear evolution equations associated with the chiral field spectral problem
[PREPRINT-455] N86-18112

CHLORINATION
On recovery of platinum from spent catalysts
[CE-TRANS-8042] N86-17499

CHLOROSILANES
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472

CHROMIUM
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548

CHROMIUM STEELS
The influence of heat affected zone microstructures on the ductility and hydrogen embrittlement of 9 percent Cr 1 percent Mo steel
[AERE-R-11473] N86-17564

CHROMOSOMES
HLA-D: The T cell perspective
[AD-A160019] N86-17976

CIRCUIT BREAKERS
Design of high-voltage, high-power, solid state remote power controllers for aerospace applications N86-17456

CIRCUIT PROTECTION
Design of high-voltage, high-power, solid state remote power controllers for aerospace applications N86-17456

CIRCUIT RELIABILITY
Improving the response time of a switching regulator using SENSIT and DESIGN/ASTAP --- spacecraft power supplies N86-17462
Class E frequency multipliers N86-17615

CIRCUITS
Time domain analysis of an S3R system --- sequential switching shunt regulator (S3R) N86-17463
A device for computer-controlled potential modulation in electrochemical Fourier transform infrared spectroscopy
[AD-A159826] N86-17620

CIRCULAR CYLINDERS
Direct simulation of the incompressible flow at high Reynolds number by finite difference method N86-17276
Vorticity shedding over two-dimensional bodies N86-17658
finite element analysis of transient forced convection and conjugate heat transfer N86-17660
Numerical simulation of flow around circular cylinders at high Reynolds numbers --- offshore structures
[Z-50551] N86-17697

CIRCULAR PLATES
Study of plate impedances
[ESA-CR(P)-2086] N86-17802

CIRCULAR POLARIZATION
Inverse Faraday effect in hemoglobin detected by Raman spectroscopy: An example of magnetic resonance Raman activity
[AD-A159806] N86-17975

CISLUNAR SPACE
Systems analysis of solid fuel nuclear engines in cislunar space
[ILR-MITT-142] N86-18171

CITIES
Area coverage of radio networks: Method description and propagation measurements in urban area
[FOA-C-30397-E2] N86-17612
Application of linked three-dimensional Planetary Boundary Layer (PBL) and dispersion models to New York City --- air pollution N86-17904
Study on a city's safety: Poitiers (France)
[SNIAS-852-422-104] N86-18257

CIVIL AVIATION
Activities report for the West German civil airports. Part 2: Tables
[ISBN-3-87977-056-5-PT-2] N86-17327
Establishment and use of time unification system for civil aviation N86-17648

CLIMATOLOGY
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909

CLOCKS
Establishment and use of time unification system for civil aviation N86-17648

CLOSED CYCLES
Channel design for closed cycle MHD
[NLR-MP-84053-U] N86-18205

CLOUD DISPERSAL
Dispersion of heavy gases N86-17899

CLOUDS (METEOROLOGY)
Monthly infrared imagery enhancement curves: A tool for nighttime sea fog identification off the New England Coast
[PB85-237725] N86-17966

CLUMPS
Investigation of the formation, ionization, and collision dynamics of microclusters using scattering analysis
[MPIS-6/1985] N86-18161

COASTAL CURRENTS
Tsunamis in Peru-Chile
[PB85-247815] N86-17973

COAXIAL CABLES
Discharge detection in high voltage flight hardware N86-17457

COBALT
Development of cobalt-free high grade permanent magnets on the basis of MnAl alloys
[BMFT-FB-T-85-099] N86-17559

COBALT ALLOYS
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530

COCHLEA
Visualisations of speech based on a model of the peripheral auditory system
[NPL-DITC-62/85] N86-17593

COCKPITS
Helicopter cockpit organization for night vision
[SNIAS-852-210-103] N86-17996
Helicopter internal noise treatment. Recent methodolgies and practical applications
[SNIAS-852-210-102] N86-18133

COGENERATION
Gas turbines in cogeneration: Overall analysis and numerical predictions N86-17758
A rational efficiency analysis of comparisons and trends in gas turbines for cogeneration N86-17759

COHERENT ELECTROMAGNETIC RADIATION
White light optical information processing
[AD-A160311] N86-18180

COHESION
Use of peel values in structural analysis N86-17394

COLD PLASMAS
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472

COLD ROLLING
Development of a manufacturing procedure to produce cold rolling cylinders by deposing a high alloy steel layer on a normal steel cylinder
[REPT-1645] N86-17586

COLLISION AVOIDANCE
Beam steerable microwave antenna for automotive radar application N86-17591

COLLISION PARAMETERS
Model for charge state distributions of heavy Coulomb explosion fragment ions
[DE85-018363] N86-18144
New and old accelerators: What can they do for astrophysics
[DE85-013220] N86-18165
Low level RF system for the Fermilab Tevatron
[DE85-017440] N86-18166
Treatment of strange particle decays observed in the UA5 streamer chambers
[USIP-85-16] N86-18175

COLLISIONS
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143

COLOR
Color on displays. Part 1: The psychophysical and physiological aspects
[IZF-1985-11] N86-17994

COLOR CENTERS
Development of solid state vibrational lasers
[AD-A159817] N86-17732

COLOR INFRARED PHOTOGRAPHY
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterschelde (the Netherlands)
[MDLK-R-8509] N86-17722

COMBINATORIAL ANALYSIS
Contributions to combination coding: Sum ordering and covering radius
[ENST-85E002] N86-17600
Algorithmic orbit classification for connected solvable groups
[ZW-8411] N86-18072
Point-line characterizations of buildings
[CWI-PM-R8415] N86-18076

COMBINED CYCLE POWER GENERATION
Field test of an autonomous wind-diesel power plant
[BMFT-FB-T-85-092] N86-17892

COMBUSTION
Oxygen/hydrocarbon combustion devices technology N86-17407

COMBUSTION CHAMBERS
Numerical simulation method for combustion in an oxyhydrogen rocket motor N86-17283
A basic computer code for industrial burner designs. Part 1: Capability test in isothermal swirling flows N86-17284
Bouyant flow and its effect on internal insulation performance: Numerical approach N86-17388

COMBUSTION PHYSICS
Heat transfer in internal combustion engines
[DE85-011495] N86-17757

COMBUSTION PRODUCTS
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501

COMBUSTION STABILITY
Large-scale, coherent structures as drivers of ramjet combustion instabilities N86-17400
Analysis of a gas generator system
[AD-A156999] N86-17749

COMFORT
A waterproof vent valve for immersion suits
[REPT-515] N86-17988
Heat transfer in impermeable clothing: Sweat plays a role after all
[IZF-1985-9] N86-17992

COMMERCIAL AIRCRAFT
Aerodynamic design trends for commercial aircraft
[NASA-TM-77976] N86-17338
Critical analysis of turbulence restitution from acceleration measurements --- aircraft construction
[ONERA-RT-3/3567-RY-C40-R] N86-17340

COMMERCIAL SPACECRAFT
Regulatory aspects of commercial, space transportation N86-17409

COMMUNICATING
On the consistency of Koomen's fair abstraction rule
[CWI-CS-R8511] N86-18094

COMMUNICATION
Activities report of the Department of Systems and Communications, CNRS-UA 820
[ENST-85D002] N86-17611

COMMUNICATION CABLES
Report on the joint activities of the Ugo Bordoni Foundation and the Istituto Superiore delle Poste e delle Telecomunicazioni --- communications research
N86-17603

COMMUNICATION NETWORKS
Local network interconnection through a satellite point to multipoint link
[ENST-85E007] N86-17369
NOSC UNIBUS (Trademark) UNIVAC Input/Output controller
[AD-A159802] N86-17999

COMMUNICATION SATELLITES
Local network interconnection through a satellite point to multipoint link
[ENST-85E007] N86-17369
The Telecom 1 power subsystem from design to flight
N86-17434
Application of current-control modulator (MC2) control feedback for 12 GHz 20 W Electric Power Conditioner (EPC) for Telecom satellite N86-17455
Influence of the bus regulation on telecommunication spacecraft power system and distribution N86-17467
Technology achievements and projections for communication satellites of the future
[NASA-TM-87201] N86-17595
Power requirements for commercial communications spacecraft N86-17868

COMMUNICATION THEORY
Syntax and defining equations for an interrupt mechanism in process algebra
[CWI-CS-R8503] N86-18092

COMMUTATION
Analysis of a particular working mode of S3R type regulator --- telecommunication satellites N86-17441
Magnetic charge and non-associative algebras
[DE85-009931] N86-18068

COMMUTATORS
Multichannel commutators of analog signals for measurement of energy distribution over beam cross section of pulse laser N86-17644
The 400-channel commutator for measurement of energy distribution in laser beam N86-17645
Magnetic charge and non-associative algebras
[DE85-009931] N86-18068
Commutator of the quark mass matrices in the standard electroweak model and a measure of maximal CP-violation
[USIP-85-14] N86-18173

COMPARISON
Neutron dosimetry intercomparison at the National Physics Laboratory
[NPL-RS(EXT)-79] N86-18135

COMPENSATORS
Compensating structure and parameter optimization for attitude control of a flexible spacecraft
[INPE-3564-PRE/770] N86-17371

COMPOSITE MATERIALS
Development of refractory composites with improved fracture toughness
[DE86-000257] N86-17479
Applications of holographic interferometry to nondestructive inspections of composite material structures
[SNIAS-852-430-112] N86-17492
Composite materials: A source of innovation --- aircraft industry
[SNIAS-852-430-113] N86-17493
Analysis in simulated space environment of composite material behavior
[SNIAS-852-430-116] N86-17495
Filament winding: An industrial procedure --- composite materials
[SNIAS-852-430-117] N86-17496
Design of nonaxysymmetric structures (turbojet engine nacelle element)
[SNIAS-852-430-119] N86-17498
Description of a nondestructive facility using holographic interferometry
[SNIAS-852-430-105] N86-17726
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures
N86-17771
The use of ultrasonic wave attenuation to monitor polymer and composite quality
[AERE-R-11704] N86-17777
Composite materials for thermal energy storage
[DE85-017743] N86-17881
Separation of airborne and structureborne noise radiated by plates constructed of conventional and composite materials with applications for prediction of interior noise paths in propeller driven aircraft
[NASA-TM-87414] N86-18121

COMPOSITE STRUCTURES
Study of plate impedances
[ESA-CR(P)-2086] N86-17802

COMPOSITION (PROPERTY)
Compositional variation in the near surface layers: An atom probe study of surface segregation in alloys
N86-18207

COMPRESSED AIR
Performance comparison of thirty, two-stage demand regulators --- underwater breathing apparatus
[ARE(M6)-TM-83818] N86-17987

COMPRESSED GAS
Explosive decomposition of hydrazine due to rapid gas compression N86-17430

COMPRESSIBLE FLOW
Numerical solution of viscous compressible flows past an airfoil using unconditionally stable explicit method
N86-17290
Numerical analysis of transonic flow around two-dimensional airfoil by solving Navier-Stokes equations N86-17292
Computation of viscous compressible flow in a turbomachine blade array
[ONERA-RSF-27/7077-AY-408] N86-17693

COMPRESSION LOADS
Upsetting of viscoplastic medium between two rigid plates in presence of friction
[BLL-M-36390-(5828.4)] N86-17745

COMPRESSORS
Breadboard development of a hydraulically coupled free piston engine heat pump compressor
[DE85-005242] N86-17874

COMPUTATIONAL FLUID DYNAMICS
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
Current status of research on evolution of longitudinal vortices in wall turbulence N86-17272
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations
N86-17273
Development of computational fluid dynamics at NASA Ames Research Center N86-17275
Direct simulation of the incompressible flow at high Reynolds number by finite difference method
N86-17276
Computation of the two-dimensinal incompressible Navier-Stokes equations using an implicit factored method N86-17277
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment
N86-17278
Numerical analysis of fully three-dimensional flow in transonic turbine cascades N86-17279
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method
N86-17280
Numerical flow analysis for axial flow turbine
N86-17281
Development of subsonic computational aerodynamic program using panel method N86-17286
Validation and comparison with experiment of a high Reynolds number transonic flow airfoil analysis code NSFOIL N86-17294
The role of computational fluid dynamics in aeronautical engineering
[REPT-2] N86-17296
Application of computational aerodynamics to wing design N86-17297
A system for computer aided analysis and design of multielement airfoils: MAD
[NLR-TR-83136-U] N86-17321
A survey of computational methods for subsonic and transonic aerodynamic design
[NLR-MP-84066-U] N86-17323
Development of a Two-Dimensional/Axisymmetric implicit Navier-Stokes solver using flux-difference splitting concepts and fully general geometry
[AD-A159776] N86-17667
Flow calculation in pump impellers by finite elements
N86-17679
Two-fluid models of turbulence
[NASA-CR-176419] N86-17687
Multigrid solution of the steady Euler equations
[CWI-NM-R8505] N86-17696
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699
Boundary layer calculations on the leeward surface of a slender delta wing at incidence
[NLR-TR-84001-U] N86-17700
The use of vector computers in aerodynamic computations
[NLR-MP-84051-U] N86-18031
Interface procedures for overlapping grids
[NASA-CR-176460] N86-18061

COMPUTATIONAL GRIDS
Numerical grid generation using algebraic and geometrical techniques N86-17288
Interface procedures for overlapping grids
[NASA-CR-176460] N86-18061

COMPUTER AIDED DESIGN
An interactive design system for winged space vehicle
N86-17269
Numerical flow analysis for axial flow turbine
N86-17281
Application of a constrained inverse method in the aerodynamic design of a low speed wing-slat configuration
[NLR-TR-83123-U] N86-17320
A system for computer aided analysis and design of multielement airfoils: MAD
[NLR-TR-83136-U] N86-17321
Optimization in design processes: An informatics point of view
[NLR-MP-84074-U] N86-17349
Improving the response time of a switching regulator using SENSIT and DESIGN/ASTAP --- spacecraft power supplies N86-17462
A computer analysis tool for evaluation of solar array design N86-17468
Microwave sensor design using CAD techniques
[AD-A159518] N86-17617
A Computer Aided Design (CAD) system as a tool for the ergonomist in developing man-machine systems
[IZF-1985-10] N86-17993
CAD-CAM database management at Bendix Kansas City
[DE85-017579] N86-18001
Test of Applicon Bravo
[A-13] N86-18007
Making IGES work for CAD/CAM data exchange
[DE85-015570] N86-18024
Intelligent gateway processors as integrators of CAD/CAM networks
[DE85-016287] N86-18025
Computer Aided Design (CAD) at the National Aerospace Laboratory (Netherlands) with the accent on aircraft flight control systems
[NLR-MP-84032-U] N86-18030
Test of Intergraph
[A-11] N86-18047
Test of Superdraft
[A-12] N86-18048
Engineering Data Interactive Presentation and Analysis System (EDIPAS): A general approach to engineering data management and analysis applied to wind tunnel testing
[NLR-MP-83057-U] N86-18252

COMPUTER AIDED MANUFACTURING
CAD-CAM database management at Bendix Kansas City
[DE85-017579] N86-18001
Making IGES work for CAD/CAM data exchange
[DE85-015570] N86-18024
Intelligent gateway processors as integrators of CAD/CAM networks
[DE85-016287] N86-18025

COMPUTER AIDED MAPPING
Contributions to geodesy, photogrammetry, and cartography, series 2
[ISSN-0469-4244] N86-17818
Integration of remote sensing data and cartographic data bases into a land information system N86-17820
The GRAL graphic system for situational maps
[FOA-C-50007-H2] N86-17824
On-line superposition of geographical data to TIROS-N type meteorological satellite images
[NLR-TR-82133-U] N86-17962

COMPUTER ASSISTED INSTRUCTION
Computer-managed instruction: Crystallized and fluid intelligence
[AD-A160017] N86-18013
Simulation in computer assisted instruction
[DE85-018208] N86-18026

COMPUTER GRAPHICS
Computer simulation of environmental, hazard scenarios in space N86-17411
Visualisations of speech based on a model of the peripheral auditory system
[NPL-DITC-62/85] N86-17593

Evaluation of data obtained from atmospheric laser Doppler velocimeter
[NASA-CR-178474] N86-17703
Plan for evaluation of the training potential of helmet-mounted display and computer-generated synthetic imagery
[AD-A160299] N86-17705
GRAPS: Graphical Plotting System
[AD-A159808] N86-17821
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs
[PB85-248110] N86-17967
Test of Applicon Bravo
[A-13] N86-18007
TRANSL: A subroutine library for PATRAN-G translators
[DE85-017634] N86-18020
Making IGES work for CAD/CAM data exchange
[DE85-015570] N86-18024
Intelligent gateway processors as integrators of CAD/CAM networks
[DE85-016287] N86-18025
Simulation in computer assisted instruction
[DE85-018208] N86-18026
Postprocessing NLR High Speed Tunnel (HST) wind tunnel data by data by means of Engineering Data Interactive Presentation and Analysis System (EDIPAS)
[NLR-MP-84083-U] N86-18032
Test of Intergraph
[A-11] N86-18047
Test of Superdraft
[A-12] N86-18048
Benchmarking: Graphics workstations
[DE85-018182] N86-18049
Engineering Data Interactive Presentation and Analysis System (EDIPAS): A general approach to engineering data management and analysis applied to wind tunnel testing
[NLR-MP-83057-U] N86-18252

COMPUTER INFORMATION SECURITY
SSMS: A Secure Software Management System
[AD-A159489] N86-18008

COMPUTER NETWORKS
Making IGES work for CAD/CAM data exchange
[DE85-015570] N86-18024
Intelligent gateway processors as integrators of CAD/CAM networks
[DE85-016287] N86-18025
Time-driven algorithms for distributed control --- computer networks
[CWI-CS-R8510] N86-18037
Implementation assessment of the OSI network service. The test responder specification --- Open Systems Interconnection (OSI)
[NPL-DITC-56/85] N86-18045
Overview of a test suite for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-59/85] N86-18046
Benchmarking: Graphics workstations
[DE85-018182] N86-18049
A Markovian model, with state-dependent parameters, of a transactional system supported by checkpointing and recovery strategies --- computer networks N86-18110

COMPUTER PROGRAM INTEGRITY
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354
Characterizing software with objective measurements
[AD-A160018] N86-18014

COMPUTER PROGRAMMING
Research in computer science
[NASA-CR-176486] N86-17998
Technical overview of the information resource dictionary system
[PB85-224491] N86-18004
Characterizing software with objective measurements
[AD-A160018] N86-18014
Codes for write-once memories
[ENST-84D004] N86-18027
The efficiency of the Equation Interpreter compared with the University of New Hampshire (UNH) Prolog interpreter
[CWI-CS-R8509] N86-18035
Infinite streams and finite observations in the semantics of uniform concurrency (preliminary version)
[CWI-CS-R8508] N86-18036
Structural and parametric identification of Multiple Input Multiple Output program guide (MIMO) systems according to Guidorzi N86-18038
Structural and parametric identification of Multiple Input Multiple Output (MIMO) systems according to Guidorzi, program guide N86-18039
Methods for Designing Software to Fit Human Needs and Capabilities. Proceedings of the Workshop on Software Human Factors
[AD-A156647] N86-18242

COMPUTER PROGRAMS
A basic computer code for industrial burner designs. Part 1: Capability test in isothermal swirling flows N86-17284
Validation and comparison with experiment of a high Reynolds number transonic flow airfoil analysis code NSFOIL N86-17294
The comparison of the transonic airfoil calculation by NSFOIL with the wind tunnel test data at high Reynolds number N86-17295
Application of computational aerodynamics to wing design N86-17297
The analysis of practical transonic swept wings with and without boundary layer effects N86-17300
Cracked ballistic grain tests and analysis N86-17383
LOX/LH2 vane pump for auxiliary propulsion systems N86-17397
finite element analysis of transient forced convection and conjugate heat transfer N86-17660
The numerical calculation of particle-size distributions in 2D jets and boundary layers
[CFD/85/6] N86-17688
Residual strength of bonded stiffened panels: Prediction and experimental verification
[NLR-TR-83066-U] N86-17808
A double-curved triangular shell element allowing the analysis of shell problems in the plastic domain
[LAB-REPT-761] N86-17811
Contributions to geodesy, photogrammetry, and cartography, series 2
[ISSN-0469-4244] N86-17818
A system of computer programs for an astrogravimetric geoid determination N86-17819
GRAPS: Graphical Plotting System
[AD-A159808] N86-17821
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017875] N86-17956
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs
[PB85-248110] N86-17967
NOSC UNIBUS (Trademark) UNIVAC Input/Output controller
[AD-A159802] N86-17999
A graph theoretic algorithm for contour surface display generation
[AD-A159822] N86-18000
Technical overview of the information resource dictionary system
[PB85-224491] N86-18004
Reusable software: Trade-off analysis and a new approach
[AD-A159813] N86-18009
Probabilistic analysis of fault trees using pivotal decomposition
[AD-A159856] N86-18012
Characterizing software with objective measurements
[AD-A160018] N86-18014
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019
TRANSL: A subroutine library for PATRAN-G translators
[DE85-017634] N86-18020
ALKACYCL: A basic computer program for the analysis of alkali metal Rankine power cycles
[DE85-018125] N86-18022
MFTF-B load-flow analysis: A mainframe application implemented on a personal computer
[DE85-018155] N86-18023
Microprocessor control of wind-driven induction generators N86-18050
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060
Software for rootfinding and interpolation with Runge-Kutta-Sarafyan methods
[DE85-018113] N86-18070

COMPUTER STORAGE DEVICES
Codes for write-once memories
[ENST-84D004] N86-18027

COMPUTER SYSTEMS DESIGN
Guide to the automation of data-processing centers --- meteorological data
[WMO-636] N86-18003
Databases and automated reasoning
[DE85-018348] N86-18247

COMPUTER SYSTEMS PERFORMANCE
Hardware/software Failure Mode Effect Analysis (FMEA) applied to airplane safety
[NLR-MP-84073-U] N86-17325
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354
A Computer Aided Design (CAD) system as a tool for the ergonomist in developing man-machine systems
[IZF-1985-10] N86-17993
Test of Applicon Bravo
[A-13] N86-18007
Validation of a software package for communication systems analysis and design: The TOPSIM 3 software
[ESA-CR(P)-2075] N86-18029
On the garbage collection of block structured memories
[RSRE-85006] N86-18043
Test of Intergraph
[A-11] N86-18047
Test of Superdraft
[A-12] N86-18048

COMPUTER SYSTEMS PROGRAMS
Spacecraft Orbital Power Evaluation (SCOPE) N86-17442
A new small signal ac analysis tool for space power systems N86-17443
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
Computation of viscous compressible flow in a turbomachine blade array
[ONERA-RSF-27/7077-AY-408] N86-17693
Validation of a software package for communication systems analysis and design: The TOPSIM 3 software
[ESA-CR(P)-2075] N86-18029

COMPUTER TECHNIQUES
Research in computer science
[NASA-CR-176486] N86-17998
A graph theoretic algorithm for contour surface display generation
[AD-A159822] N86-18000
Novel computer architectures for data storage and retrieval
[BLRDR-5845] N86-18005
The RAND-ABEL programming language: History, rationale, and design
[AD-A159821] N86-18010
Simulation in computer assisted instruction
[DE85-018208] N86-18026
Benchmarking: Graphics workstations
[DE85-018182] N86-18049
A combination of artificial intelligence and procedural language programs in a computer application system supporting nuclear reactor operations
[DE85-007937] N86-18052

COMPUTERIZED SIMULATION
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270
Direct simulation of the incompressible flow at high Reynolds number by finite difference method N86-17276
Numerical simulation method for combustion in an oxyhydrogen rocket motor N86-17283
Error propagation in a digital avionic processor: A simulation-based study
[NASA-CR-176501] N86-17351
Bouyant flow and its effect on internal insulation performance: Numerical approach N86-17368
Moonburner: An ultra-high web fraction grain design N86-17392
Computer simulation of environmental, hazard scenarios in space N86-17411
MATPWR: A mission analysis tool for LEO spacecraft power profiles computation N86-17469
Composite operational amplifiers and their use in improving bandwidth, speed and accuracy in active networks
[AD-A159819] N86-17619
A CSMP commutation model for design study of a brushless dc motor power conditioner for a cruise missile fin control actuator
[AD-A159855] N86-17621
Analysis of the solar powered/fuel assisted Rankine cycle cooling system. Phase 1: Revision
[DE85-016173] N86-17675
Simulation of flame acceleration in unconfined vapor cloud explosions
[VTT-RR-357] N86-17698
TECATE: A code for anisotropic thermoelasticity in high-average-power laser technology, phase 1
[DE85-016067] N86-17736
Numerical simulation of impact tests and comparison of behavior laws
[SNIAS-852-320-101] N86-17813
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
Superlattices and multilayer structures for high efficiency solar cells N86-17850
Photovoltaic array performance simulation models
[DE85-016542] N86-17878

Assessment of the performance of an in-field Gaussian plume/puff model for overwater use
[AD-A160032] N86-17955
A Computer Aided Design (CAD) system as a tool for the ergonomist in developing man-machine systems
[IZF-1985-10] N86-17993
The RAND-ABEL programming language: History, rationale, and design
[AD-A159821] N86-18010
Performance and reliability analysis using directed acyclic graphs
[AD-A160313] N86-18016
Simulation in computer assisted instruction
[DE85-018208] N86-18026
Validation of a software package for communication systems analysis and design: The TOPSIM 3 software
[ESA-CR(P)-2075] N86-18029
Structural and parametric identification of Multiple Input Multiple Output (MIMO) systems according to Guidorzi. Further developments and applications N86-18040
Expert systems for design and simulation
[DE85-017565] N86-18053
Direction of arrival estimation of eigenstructure methods with unknown sensor gain and phase
[AD-A160027] N86-18065
An explicit scheme for the prediction of ocean acoustic propagation in three dimensions
[AD-A160053] N86-18125

COMPUTERS
Benchmarking: Graphics workstations
[DE85-018182] N86-18049

CONCENTRATION
Reaction enhancement of heterogeneously catalyzed reactions by concentration forcing
[DE86-000220] N86-17514

CONCENTRATORS
Performance of Hughes GaAs concentrator cells under 1-MeV electron irradiation N86-17860

CONCRETES
Chemically bonded ceramic materials for use in thermal energy storage devices
[DE85-018078] N86-17572
International Symposium on Mechanical Properties of Special Concrete
[PB85-234961] N86-17770

CONDENSATES
Ultraviolet laser-induced photocondensation in the benzol vapor phase
[MPIS-4/1985] N86-17520

CONDUCTIVE HEAT TRANSFER
Thermal stratification in direct gain passive heating systems with variable heating of the floor and one vertical wall
[DE85-016860] N86-17677
Progress in the development of a two-fluid model of turbulence for near-wall flows. Part 2: Heat-transfer characteristics of a boundary layer
[CFD/84/8-PT-2] N86-17686
Heat transfer in internal combustion engines
[DE85-011495] N86-17757

CONFERENCES
Powder metallurgy: Technology and equipment
[BLL-M-36380-(5828.4)] N86-17524
International Symposium on Mechanical Properties of Special Concrete
[PB85-234961] N86-17770
Space Environment Workshop N86-17871
Pollutant dispersal --- air pollution, conference
[VKI-LS-1985-02] N86-17895
Proceedings of the 19th Finnish Astronomers' Days
[REPT-S-162] N86-18258

CONFIDENCE LIMITS
Reliability of nondestructive inspection
[NLR-TR-84011-U] N86-17775
Uncertainty estimation from system identification
[OUEL-1570/85] N86-18075
Modified confidence intervals for the mean of an autoregressive process
[AD-A160055] N86-18107

CONFORMAL MAPPING
Multiwell Experiment Geophysics Program
[DE86-001147] N86-17940
Markov tree model of transport in area preserving maps
[DE86-000237] N86-18238

CONGRESSIONAL REPORTS
Controlled Impact Demonstration (CID)
[GPO-46-870] N86-17324
Results of space shuttle flight 51-A
[GPO-44-770] N86-17367

CONICAL BODIES
A wind tunnel investigation of the effect of a propulsive jet on controls located on a conical afterbody in subsonic and supersonic free streams
[FFA-TN-1985-11] N86-17318

CONSERVATION EQUATIONS
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301

CONSONANTS (SPEECH)
Speech processing for intelligibility improvement
[IZF-1985-14] N86-17610

CONSTITUTIVE EQUATIONS
Theoretical and experimental investigations of a thermoplastic constitutive law
[RUB-IFM-MITT-43] N86-18233

CONSTRAINTS
Results of PRIM gyroscope testing: Conclusions regarding PRIM effects, supplement 1
[DE85-012933] N86-17706

CONTAMINANTS
Visibility model verification by image processing techniques
[PB85-222800] N86-17925

CONTINUOUS RADIATION
Generation of magnetospheric radiation by decay of Bernstein waves
[KGI-PREPRINT-076] N86-17942

CONTINUOUS WAVE LASERS
A study of continuous wave lasing and modelocking in a neodymium-phosphate glass crystal N86-17729
Development of solid state vibrational lasers
[AD-A159817] N86-17732

CONTOURS
Calculating radar detection probabilities by contour integration N86-17590
A graph theoretic algorithm for contour surface display generation
[AD-A159822] N86-18000

CONTROL STABILITY
A wind tunnel investigation of the effect of a propulsive jet on controls located on a conical afterbody in subsonic and supersonic free streams
[FFA-TN-1985-11] N86-17318

CONTROL SURFACES
Application of computational aerodynamics to wing design N86-17297

CONTROL SYSTEMS DESIGN
Development of a sensitivity analysis technique for multiloop flight control systems
[NASA-CR-166619] N86-17358
A control system design approach for flexible spacecraft
[NASA-TM-87599] N86-17373
Improving the response time of a switching regulator using SENSIT and DESIGN/ASTAP --- spacecraft power supplies N86-17462
USSR report: Electronics and electrical engineering
[JPRS-UEE-84-016] N86-17640
Some aspects of the dynamic behavior of an assembly robot N86-17765
Computer Aided Design (CAD) at the National Aerospace Laboratory (Netherlands) with the accent on aircraft flight control systems
[NLR-MP-84032-U] N86-18030
Self-tuning control: Algorithms and applications
[OUEL-1567/85] N86-18055
Design for a path control algorithm of a robot arm with external sensor control N86-18057
Uncertainty estimation from system identification
[OUEL-1570/85] N86-18075

CONTROL THEORY
Modeling and implementation of a digitally controlled power converter using duty ratio quantization --- spacecraft power supplies N86-17461
Generalized predictive control. Part 2: Extensions and interpretations
[OUEL-1557/84-PT-2] N86-18054
Self-tuning control: Algorithms and applications
[OUEL-1567/85] N86-18055
A distributed file service based on optimistic concurrency control
[CWI-CS-R8507] N86-18251

CONTROL VALVES
Evaluation of functional experience with safety valves
[BMI-1985-080] N86-17760

CONTROLLED FUSION
Maryland controlled fusion research program. Volume 1
[DE85-018027] N86-18197

CONTROLLERS
Development of a sensitivity analysis technique for multiloop flight control systems
[NASA-CR-166619] N86-17358
Compensating structure and parameter optimization for attitude control of a flexible spacecraft
[INPE-3564-PRE/770] N86-17371
Microprocessor control of wind-driven induction generators N86-18050

CONVECTION CURRENTS
Cyclic mean flows in the Sun as a probe of the dynamo action N86-18259

CONVECTIVE HEAT TRANSFER
Laminar forced convective heat transfer of power law fluids in isosceles triangular ducts with peripheral wall conduction N86-17659
Thermal stratification in direct gain passive heating systems with variable heating of the floor and one vertical wall
[DE85-016860] N86-17677

CONVERGENCE
The scenario test driver for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-55/85] N86-18044
Overview of a test suite for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-59/85] N86-18046
Convergence and order reduction of diagonally implicit Runge-Kutta schemes in the method of lines
[CWI-NM-R8506] N86-18089
A difference procedure to solve quasilinear plasma physics parabolic systems
[PREPRINT-892] N86-18204

CONVOLUTION INTEGRALS
The application of optimal control methods to the deconvolution of velocity meter signals
[ISVR-TR-128] N86-17717
Stability, multiplicity and global continuation of symmetric periodic solutions of a nonlinear Volterra integral equation
[CWI-AM-R8502] N86-18078

COOLING SYSTEMS
Analysis of the solar powered/fuel assisted Rankine cycle cooling system. Phase 1: Revision
[DE85-016173] N86-17675

COORDINATES
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs
[PB85-248110] N86-17967

COPOLYMERS
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501

COPPER
Structural phase transition in CeCu6
[DE85-018362] N86-18223

COPPER ALLOYS
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387
The corrosion properties of aluminum bronzes: A literature review
[KIS-1985-3E] N86-17532
High strain rate deformation in FCC metals and alloys
[DE85-017533] N86-17536
Coupled electron-nuclear magnetism and neutron diffraction
[DE85-016479] N86-17539
Survey of physical property data for several alloys
[DE85-018138] N86-17542

COPPER COMPOUNDS
The evaluation of copper compounds as potential fuel biocides
[AMTE(M)-84520] N86-17974

CORES
Survey of physical property data for several alloys
[DE85-018138] N86-17542

CORIOLIS EFFECT
Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects
[NASA-TM-87207] N86-17789

CORN
Hydrological description of a study area around pump station 't Klooster (the Netherlands); application of hydrological models and remote sensing
[NOTA-1542] N86-17831
Simple method for the determination of regional daily evapotranspiration of crops using remote sensing
[NOTA-1580] N86-17832
Study of effects of pump station Olden Eibergen (Netherlands) on agriculture using remote sensing and hydrological models
[NOTA-1544] N86-17833

CORNER FLOW
Results for analytical transonic flow patterns with weak shock waves over curved walls with a corner
[STN-9] N86-17319

CORNERS
Formulation of a one-dimensional boundary integral equation for three-dimensional elastostatic corner problems
[PREPRINT-886] N86-18083

CORONA BOREALIS CONSTELLATION
Photometry of R Coronae Borealis and hydrogen-deficient carbon stars, 1982-3 N86-18275
CORRELATION
A FORTRAN 77 program and user's guide for the calculation of partial correlation and standardized regression coefficients
[TI85-016573] N86-18018
CORROSION
Corrosion of metals by hydrazine N86-17395
Study of the influence of pitting corrosion on the fatigue characteristics of Marvac 18
[M2-666500] N86-17556
Corrosion of materials in absorption heating and refrigeration fluids
[DE85-018140] N86-17585
CORROSION PREVENTION
Metallizing of fiber reinforced composites
[MBB-Z-46/48] N86-17482
CORROSION RESISTANCE
The corrosion properties of aluminum bronzes: A literature review
[KIS-1985-3E] N86-17532
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568
Corrosion of materials in absorption heating and refrigeration fluids
[DE85-018140] N86-17585
CORROSION TESTS
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426
Determination of the susceptibility of silver-plated copper wire/cable to red plague corrosion
[ESA-PSS-01-720-ISSUE-1] N86-17554
COSMIC RAY SHOWERS
Comment on an unusual event in the E594 detector from the direction of Cygnus X-3
[DE85-018341] N86-18278
COST ANALYSIS
Applications of microalloyed steels to stamping
[CETIM-13-K-301] N86-17557
Noise assessment around Schiphol airport (the Netherlands) in 1981
[NLR-TR-82034-U] N86-17915
Noise assessment around Rotterdam airport (the Netherlands) in 1981
[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922
Systems analysis of solid fuel nuclear engines in cislunar space
[ILR-MITT-142] N86-18171
COST EFFECTIVENESS
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
Array technology and applications N86-17872
COUETTE FLOW
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
COULOMB COLLISIONS
Model for charge state distributions of heavy Coulomb explosion fragment ions
[DE85-018363] N86-18144
COUPLERS
Applications of fiber optic couplers to diagnostic experiments at the Nevada Test Site
[DE85-016787] N86-18181
COUPLING
Effect of dynamic stall and elastic parameters on the fundamental mechanisms of helicopter vibrations
[AD-A160022] N86-17355
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109
COVALENCE
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds
[DE85-017094] N86-17505
CRACK ARREST
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate
[TI85-016420] N86-17795
CRACK CLOSURE
Closure of fatigue cracks at high strains
[NASA-CR-175021] N86-17788
CRACK INITIATION
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227096] N86-17769
Crack growth in an elastic-primary creeping material N86-17779
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate
[TI85-016420] N86-17795
CRACK PROPAGATION
Cracked ballistic grain tests and analysis N86-17383
Crack growth in an elastic-primary creeping material N86-17779
The mechanics of a near-surface crack under uniform pressure or shear in a transversely isotropic medium: With applications to hydraulic fracture N86-17780
Closure of fatigue cracks at high strains
[NASA-CR-175021] N86-17788
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate
[TI85-016420] N86-17795
Slow crack growth: Macroscopic and microscopic aspects
[DE85-011165] N86-17798
Automatic crack length measurements by the electrical potential drop method with computer control
[VTH-LR-309] N86-17805
CRACKING (FRACTURING)
Cracked ballistic grain tests and analysis N86-17383
CRASH LANDING
Controlled Impact Demonstration (CID)
[GPO-46-870] N86-17324
CRASHWORTHINESS
Controlled Impact Demonstration (CID)
[GPO-46-870] N86-17324
CRAY COMPUTERS
The use of vector computers in aerodynamic computations
[NLR-MP-84051-U] N86-18031
CREEP PROPERTIES
Diffusional creep of multicomponent systems
[DE86-000184] N86-17549
Chemical and microstructural effects on the diffusional creep behaviour of AISI type 316 stainless steel
[AERE-R-11322] N86-17563
Crack growth in an elastic-primary creeping material N86-17779
CREEP RUPTURE STRENGTH
Creep-rupture behavior of iron superalloys in high-pressure hydrogen
[NASA-CR-175027] N86-17531
Pressing effect and stress corrosion cracking of an extruded AlZnMgCu type aluminum alloy
[BMFT-FB-T-85-087] N86-17558
CRITICAL POINT
Tricritical behavior in the ferromagnetic superconductor ErRh4B4
[DE85-018339] N86-18229
CROSS CORRELATION
Recirculating cross-correlation detector
[DE85-017782] N86-17709
CROSS COUPLING
Crossing channel waveguide electro-optic modulators N86-18176
CROSS FLOW
Low-fin staggered tube banks: Heat transfer and pressure-loss for turbulent single-phase crossflow
[ESDU-84016] N86-17664
CRUSTAL FRACTURES
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 3: Kinematics of Great Basin intraplate extension from earthquake, geodetic and geologic information
[NASA-CR-176500] N86-17930
CRYOGENIC COOLING
Preparation of the helium-cooled German Infrared Laboratory (GIRL) interferometer for scientific use on Spacelab
[MPE-192] N86-17721
Cryogenic millimeter wave receiver for the Metsaehovi radio telescope N86-18267
CRYOGENIC EQUIPMENT
Operational tests of the BNL 24.8 kW, 3.8 K helium refrigerator
[DE85-017851] N86-17584
Cryogenic millimeter wave receiver for the Metsaehovi radio telescope N86-18267
CRYOGENIC ROCKET PROPELLANTS
Small, two-stage, partial-admission turbine N86-17386
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387
CRYOGENICS
Precision cryogenic temperature data acquisition system
[DE85-017847] N86-17712
CRYSTAL DEFECTS
Shape and depth of the crystallisation front in steel ingots remelted by the electroslag method determined with the aid of radioactive phosphorus
[BLL-DRIC-T-TR-7561-(3623.66)] N86-17525
Overview of SERI's high efficiency solar cell research N86-17841
CRYSTAL DISLOCATIONS
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
CRYSTAL GROWTH
Method of synthesizing and growing copper-indium-diselenide (CuInSe2) crystals
[DE85-017729] N86-18215
Process for selectively patterning epitaxial film growth on a semiconductor substrate
[DE85-017733] N86-18216
CRYSTAL LATTICES
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
Disorder and transport in lithium/aluminum
[DE85-018389] N86-18231
CRYSTAL OPTICS
Nonlinear refractive index measurements of isotropic liquid crystals
[AD-A159519] N86-18209
CRYSTAL STRUCTURE
First order phase transformations: Scaling relations for grain self-correlation functions
[DE85-017509] N86-18213
Structure of high-pressure KNO3-4
[DE85-018361] N86-18222
CRYSTAL SURFACES
Catalytic reactivity of thin crystal surfaces
[DE85-018293] N86-18228
CRYSTALLINITY
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937
Northeastern regional geologic characterization report. Volume 3: Plates
[DE86-000418] N86-17938
CRYSTALLIZATION
Shape and depth of the crystallisation front in steel ingots remelted by the electroslag method determined with the aid of radioactive phosphorus
[BLL-DRIC-T-TR-7561-(3623.66)] N86-17525
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
CRYSTALLOGRAPHY
Gelation of aluminum hydroxide sols
[SNIAS-852-430-19] N86-17562
Activities report in fundamental research on matter (FOM) N86-18118
CULTURE TECHNIQUES
HLA-D: The T cell perspective
[AD-A160019] N86-17976
CURING
Study of composite material curing molds
[DGT-26.817] N86-17486
CURRENT REGULATORS
Analysis of a particular working mode of S3R type regulator — telecommunication satellites N86-17441
Application of current-control modulator (MC2) control feedback for 12 GHz 20 W Electric Power Conditioner (EPC) for Telecom satellite N86-17455
An analytical investigation of current-injected control for constant-frequency switching regulators N86-17458
CURVATURE
A double-curved triangular shell element allowing the analysis of shell problems in the plastic domain
[LAB-REPT-761] N86-17811
The indexing properties of an ancillary statistic
[AD-A160030] N86-18105
CURVE FITTING
A rapid method for estimating equivalent parabolic polars from wind-tunnel tests
[RAE-TM-AERO-2034] N86-17309

CYCLIC COMPOUNDS
Polynuclear pyrazolyl-bridged spiro species containing boron and metal centers
[AD-A159847] N86-17569
CYCLIC LOADS
Cyclic structural analyses of anisotropic turbine blades for reusable space propulsion systems N86-17404
Closure of fatigue cracks at high strains
[NASA-CR-175021] N86-17788
CYCLOTRON RADIATION
Maryland controlled fusion research program. Volume 1
[DE85-018027] N86-18197
CYLINDERS
Horseshoe vortex formation around a cylinder N86-17658
CYLINDRICAL SHELLS
Free vibrations of finite flexible shells and tubes in axial flow N86-17804

D

DAMAGE
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
DAMAGE ASSESSMENT
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena
[NASA-CR-176485] N86-17475
DAMPING
Programmable high power beam damper for the Tevatron
[DE85-017441] N86-18167
DATA ACQUISITION
Remote and in-situ analysis
[DE85-017397] N86-17515
High-voltage measurements using digital techniques
[S/T-REPT-VOL-2-NO-8] N86-17636
Precision cryogenic temperature data acquisition system
[DE85-017847] N86-17712
Acid Deposition System (ADS) data base, data summary procedures and statistical reporting of spatial patterns and trends
[DE85-017910] N86-17907
Revised Uniform Summary of Surface Weather Observations, Sparrevohn AFS, Alaska
[AD-A159864] N86-17953
Hanford 1964 atmospheric boundary layer experiment: Micrometeorological and tracer data archive. Set 002 documentation report
[PB85-243145] N86-17963
Installation of automated weather observing systems by FAA (Federal Aviation Administration) at commercial airports is not justified
[PB85-241347] N86-17964
Array positioning requirements
[AD-A159866] N86-18124
DATA BASE MANAGEMENT SYSTEMS
CAD-CAM database management at Bendix Kansas City
[DE85-017579] N86-18001
SSMS: A Secure Software Management System
[AD-A159489] N86-18008
Bibliographic post-processing with the TIS Intelligent Gateway: Analytical and communication capabilities
[DE85-018153] N86-18245
Databases and automated reasoning
[DE85-018348] N86-18247
A distributed file service based on optimistic concurrency control
[CWI-CS-R8507] N86-18251
Engineering Data Interactive Presentation and Analysis System (EDIPAS): A general approach to engineering data management and analysis applied to wind tunnel testing
[NLR-MP-83057-U] N86-18252
DATA BASES
Critical analysis of turbulence restitution from acceleration measurements --- aircraft construction
[ONERA-RT-3/3567-RY-C40-R] N86-17340
The mechanical property data base from a cooperative program on first generation PM (Powder Metallurgy) aluminums
[AD-A159779] N86-17534
Contributions to geodesy, photogrammetry, and cartography, series 2
[ISSN-0469-4244] N86-17818
Integration of remote sensing data and cartographic data bases into a land information system N86-17820
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875
Acid Deposition System (ADS) data base, data summary procedures and statistical reporting of spatial patterns and trends
[DE85-017910] N86-17907
The Norwegian Seismic Array (NORSAR)
[AD-A159820] N86-17933
National Geophysical Data Center
[PB85-248458] N86-17947
Query language for the Profiler data system
[PB85-240190] N86-17965
The RAND-ABEL programming language: History, rationale, and design
[AD-A159821] N86-18010
Databases and automated reasoning
[DE85-018348] N86-18247
DATA LINKS
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-1] N86-17365
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-2] N86-17366
DATA MANAGEMENT
Postprocessing NLR High Speed Tunnel (HST) wind tunnel data by data by means of Engineering Data Interactive Presentation and Analysis System (EDIPAS)
[NLR-MP-84083-U] N86-18032
DATA PROCESSING
Hanford 1964 atmospheric boundary layer experiment: Micrometeorological and tracer data archive. Set 002 documentation report
[PB85-243145] N86-17963
Guide to the automation of data-processing centers --- meteorological data
[WMO-636] N86-18003
MFTF-B load-flow analysis: A mainframe application implemented on a personal computer
[DE85-018155] N86-18023
A study of ERS-1 radar altimeter data processing requirements
[ESA-CR(P)-2073] N86-18028
Treatment of strange particle decays observed in the UA5 streamer chambers
[USIP-85-16] N86-18175
Study of free-index phrases
[PB85-240117] N86-18253
Computers at the Metsaehovi (Finland) radio research station N86-18265
DATA REDUCTION
A rapid method for estimating equivalent parabolic polars from wind-tunnel tests
[RAE-TM-AERO-2034] N86-17309
The Norwegian Seismic Array (NORSAR)
[AD-A159820] N86-17933
Postprocessing NLR High Speed Tunnel (HST) wind tunnel data by data by means of Engineering Data Interactive Presentation and Analysis System (EDIPAS)
[NLR-MP-84083-U] N86-18032
DATA RETRIEVAL
Query language for the Profiler data system
[PB85-240190] N86-17965
DATA SIMULATION
Electro-optical aerial reconnaissance camera: An experimental system used in a simulated reconnaissance environment
[FOA-C-30394-E1] N86-17719
DATA STORAGE
Electro-optical aerial reconnaissance camera: An experimental system used in a simulated reconnaissance environment
[FOA-C-30394-E1] N86-17719
Codes for write-once memories
[ENST-84D004] N86-18027
DATA SYSTEMS
Postprocessing NLR High Speed Tunnel (HST) wind tunnel data by data by means of Engineering Data Interactive Presentation and Analysis System (EDIPAS)
[NLR-MP-84083-U] N86-18032
DATA TRANSMISSION
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
Parallel Cholesky factorization on a hypercube multiprocessor
[DE85-018121] N86-18002
DAYTIME
Boundary layer plasmas as a source for high-latitude, early afternoon, auroral arcs
[KGI-PREPRINT-079] N86-17943
DECAMETRIC WAVES
Research on propagation of decimetric radiowaves at high latitudes N86-17641
DECAY
The interaction between electric dipoles and waveguiding surfaces at optical frequencies N86-18178
DECODERS
A systolic array implementation of a Reed-Solomon encoder and decoder
[AD-A159824] N86-18011
DECODING
The efficiency of the Equation Interpreter compared with the University of New Hampshire (UNH) Prolog interpreter
[CWI-CS-R8509] N86-18035
Channel coding with the (255, 255-2T) Reed-Solomon codes over CF (256)
[NLR-TR-83149-U] N86-18042
DECOMPOSITION
On the holomorphic continuation of the Iwasawa and a related decomposition
[CWI-PM-R8502] N86-18077
DEFECTS
Fatigue in a welded join made by pulsed MIG welding of a 304 type stainless steel
[BLL-RISLEY-TR-5233-(9091.9F)] N86-17783
DEFLECTION
Programmable high power beam damper for the Tevatron
[DE85-017441] N86-18167
DEFORMATION
High strain rate deformation in FCC metals and alloys
[DE85-017533] N86-17536
The use of acoustical caustics in fracture mechanics N86-17781
The dynamics of mechanisms with deformable links N86-17791
DEGREES OF FREEDOM
Quark dynamics of N anti N annihilation
[DE85-017508] N86-18153
DEICERS
The deiced super Puma --- helicopters
[SNIAS-852-210-104] N86-17328
DELTA WINGS
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
Boundary layer calculations on the leeward surface of a slender delta wing at incidence
[NLR-TR-84001-U] N86-17700
DELTAS
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterschelde (the Netherlands)
[MDLK-R-8509] N86-17722
DENDRITIC CRYSTALS
Influence of boron on dendrite structure of cast metal
[BLL-M-36491-(5828.4)] N86-17523
DENSITY (MASS/VOLUME)
Density gradient free electron collisionally excited X-ray laser
[DE85-017726] N86-17739
DENSITY DISTRIBUTION
Power series approximations to the null distributions of some Chi-Bar-Square statistics
[AD-A159785] N86-18101
DENSITY WAVE MODEL
How do galaxies make spiral arms: Stochastic versus gravitational N86-18262
Optical study of Sharpless 252 (NGC 2175) N86-18268
DEPLETION
Depletion layer recombination effects on the radiation damage hardness of gallium arsenide cells N86-17859
DEPLOYMENT
Introduction to deployable recovery systems
[DE86-000048] N86-17310
DEPOSITION
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879
Amorphous silicon solar cells, phase 2
[BMFT-FB-T-85-084] N86-17891
Acid Deposition System (ADS) data base, data summary procedures and statistical reporting of spatial patterns and trends
[DE85-017910] N86-17907
Acid rain: A primer on what, where, and how much
[DE85-017864] N86-17910
Effects of acid rain on forest nutrient status
[DE85-018120] N86-17911
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913
Deposition of sulfur in Europe: Methods to construct unbiased source-receptor matrices from data of a limited period (1976 - 1982). A meteorological contribution to the IIASA Regional Acidification Information and Simulation (RAINS) model
[KNMI-TR-66] N86-17923

Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926
Process for selectively patterning epitaxial film growth on a semiconductor substrate
[DE85-017733] N86-18216

DESIGN ANALYSIS
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
Space Station Engineering and Technology Development. Proceedings of the Panel on Program Performance and Onboard Mission Control
[NASA-CR-176484] N86-17372
Elastomeric Barrier Pulse Motors N86-17385
Moonburner: An ultra-high web fraction grain design N86-17392
A computer analysis tool for evaluation of solar array design N86-17468
Sample conditioning and standard preparation for synfuel gas analysis
[DE85-010073] N86-17506
Experimental results on a low-temperature magnetic refrigerator
[DE85-017541] N86-17583
Class E frequency multipliers N86-17615
Composite operational amplifiers and their use in improving bandwidth, speed and accuracy in active networks
[AD-A159819] N86-17619
A device for computer-controlled potential modulation in electrochemical Fourier transform infrared spectroscopy
[AD-A159826] N86-17620
Detailed design of a 13 kA 13 kV dc solid-state turn-off-switch
[DE85-013874] N86-17623
Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625
Machine imparting complex rotary motion for lapping a spherical inner diameter
[DE85-017790] N86-17754
Hoops
[CETIM-13-N-243] N86-17767
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Electrochemical storage and conversion: Batteries and fuel cells
[DE85-018177] N86-17886
Advanced servomanipulator development
[DE85-017720] N86-17989
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114
Helicopter internal noise treatment. Recent methodolgies and practical applications
[SNIAS-852-210-102] N86-18133
Low level RF system for the Fermilab Tevatron
[DE85-017440] N86-18166
Proposals for synchrotron light sources
[DE85-017444] N86-18168
Optical switch
[DE85-017783] N86-18184
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219

DESTRUCTIVE TESTS
Physical and chemical characterization of multilayered structures
[DE85-016922] N86-17624
Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801

DESULFURIZING
Microbial problem with storage of jet fuel in rock caverns: Development of a process for purification of corrosive jet fuel --- based on the use of powdered silver
[FOA-A-40051-B4] N86-17579

DETECTION
Method for sensing and measuring a concentration or partial pressure of a reactant used in a redox reaction
[DE85-017740] N86-17630
Coupling between plastic scintillators and light fibers for remote detection of X-rays
[DE85-016946] N86-17707

DETECTORS
Gated strip proportional detector
[DE85-017757] N86-17708

DETERIORATION
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854

DETONATION
Explosive decomposition of hydrazine due to rapid gas compression N86-17430

DEUTERIUM
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152

DEUTERONS
Position sensitive gas counter readout system
[DE85-017953] N86-17713
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148

DEVELOPING NATIONS
Activities report on the Technical Highschool Twente (THT) CWD windmill project
[WM-090] N86-17889

DEVELOPMENT
Research, development, and demonstration of nickel-iron batteries for electric vehicle propulsion
[DE86-000520] N86-17629

DIAMAGNETISM
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018082] N86-18189

DIELECTRIC PROPERTIES
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes
[AD-A158468] N86-17533

DIELECTRICS
Analysis of dielectric layers for Very Large Scale Integration (VLSI) applications, especially the influence of stoichiometry and hydrogen content on the properties of plasma nitride layers
[BMFT-FB-T-85-059] N86-17635
Study of surface discharges
[ONERA-RF-10/7236-PY] N86-17639

DIESEL ENGINES
Identification of tribological research and development needs for lubrication of advanced heat engines
[DE85-018154] N86-17756

DIFFERENCE EQUATIONS
Difference methods of higher order for elliptic boundary value problems with curved boundaries
[TUM-I8411] N86-18059
A difference procedure to solve quasilinear plasma physics parabolic systems
[PREPRINT-892] N86-18204

DIFFERENCES
Numerical analysis for steady transonic flows past an airfoil using AF scheme N86-17289

DIFFERENTIAL ANALYZERS
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017

DIFFERENTIAL EQUATIONS
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
Fault analysis in dynamic systems with application to reciprocating combustion engines N86-17746
A study of the back-and-forth shooting method --- boundary value problems
[REPT-A-3] N86-18073
An outline of the practical use of Lie series
[ESA-STR-215] N86-18082
Explicit Runge-Kutta (-Nystroem) methods with reduced phase errors for computing oscillating solutions
[CWI-NM-R8504] N86-18088
On the numerical evaluation of Bessel functions of first, second and third kind of complex argument and integer orders
[MEAH-54] N86-18097

DIFFRACTION
Effects of strong diffraction on the focusing and scattering of acoustic waves N86-18120

DIFFUSION
Chemical and microstructural effects on the diffusional creep behaviour of AISI type 316 stainless steel
[AERE-R-11322] N86-17563
Compositional variation in the near surface layers: An atom probe study of surface segregation in alloys N86-18207

DIFFUSION FLAMES
Numerical simulation method for combustion in an oxyhydrogen rocket motor N86-17283

DIFLUORO COMPOUNDS
Investigation of the dynamics of selectively rotation-vibrationally excited difluoromethylene
[MPIS-5/1985] N86-18160

DIGITAL DATA
The power spectral density of the HDB2 and the HDB3 coded signals
[FI-44-TBR-86] N86-17608
Recirculating cross-correlation detector
[DE85-017782] N86-17709
Electro-optical aerial reconnaissance camera: An experimental system used in a simulated reconnaissance environment
[FOA-C-30394-E1] N86-17719

DIGITAL FILTERS
Low cost voice compression for mobile digital radios
[NASA-CR-176490] N86-17594

DIGITAL SIMULATION
Towards digital computer simulation of the dynamics of flexible spacecraft
[NLR-TR-83106-U] N86-17376

DIGITAL SYSTEMS
Error propagation in a digital avionic processor: A simulation-based study
[NASA-CR-176501] N86-17351
The use of filters in digital coherent receivers operating in a jamming and noise environment
[AD-A159792] N86-17596
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598
Recirculating cross-correlation detector
[DE85-017782] N86-17709

DIGITAL TECHNIQUES
Digital structure of an autopiloting for asynchronous machine fed by Pulse Width Modulation (PWM) converter N86-17438
Modeling and implementation of a digitally controlled power converter using duty ratio quantization --- spacecraft power supplies N86-17461
Contributions to combination coding: Sum ordering and covering radius
[ENST-85E002] N86-17600
High-voltage measurements using digital techniques
[S/T-REPT-VOL-2-NO-8] N86-17636

DIRECT CURRENT
A synchronized dc/dc converter for the data telemetry system of INTELSAT 6 N86-17440
Fast magnetic systems, basic research
[BMFT-FB-T-85-102] N86-18117

DIRECT POWER GENERATORS
Cell Research and Technology Workshop N86-17870

DIRECTIONAL SOLIDIFICATION (CRYSTALS)
Utilization of the Swedish experiment module within the TEXUS 9/10 flight opportunity
[M5/7-14] N86-17363

DIRECTORIES
Sources of information on engineering geology and related topics for northeastern Illinois
[PB85-241933] N86-17948

DIRICHLET PROBLEM
Difference methods of higher order for elliptic boundary value problems with curved boundaries
[TUM-I8411] N86-18059
Harmonic analysis and partial differential equations
[CTH-MATH-1985-03] N86-18062

DISCHARGE COEFFICIENT
Flow calculation in pump impellers by finite elements N86-17679

DISCRETE FUNCTIONS
On the prediction and the spectral factorization of stationary processes in the broad sense with two discrete parameters
[ENST-85C002] N86-18074

DISCRIMINANT ANALYSIS (STATISTICS)
Exponential bound for error probability in NN-Discrimination
[AD-A160305] N86-18067

DISKS (SHAPES)
Viscosity, granular-temperature and stress calculations for shearing assemblies of inelastic: Frictional disks
[DE85-015173] N86-17794

DISLOCATIONS (MATERIALS)
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212

DISORDERS
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212

DISPERSING
Sensitivity, applicability and validation of bi-Gaussian off- and on-line models for the evaluation of the consequences of accidental releases in nuclear facilities --- air pollution
[EUR-9385-EN] N86-17897
Atmospheric dispersion models and their limitations
[TI85-018522] N86-17905

DISPERSIONS
The nature of charge carriers in electrorheological suspensions
[BR97662] N86-17500
Hanford 1964 atmospheric boundary layer experiment: Micrometeorological and tracer data archive. Set 002 documentation report
[PB85-243145] N86-17963
DISPLAY DEVICES
Color on displays. Part 1: The psychophysical and physiological aspects
[IZF-1985-11] N86-17994
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060
DISSOCIATION
MUPPATS: A multiparticle 3D imaging detector system
[DE85-018451] N86-17715
Large-t elastic scattering and diffraction dissociation
[NIKHEF-H/85-4] N86-18163
DISTRIBUTED PROCESSING
Partitioning problems in parallel, pipelined and distributed computing
[NASA-CR-178023] N86-17997
A new approach to the design and construction of protocol testers — X25 protocol
[NPL-DITC-54/85] N86-18006
Time-driven algorithms for distributed control — computer networks
[CWI-CS-R8510] N86-18037
Syntax and defining equations for an interrupt mechanism in process algebra
[CWI-CS-R8503] N86-18092
A distributed file service based on optimistic concurrency control
[CWI-CS-R8507] N86-18251
DISTRIBUTION (PROPERTY)
Physiochemical transformation of radioactive nuclei in water environments
[CISE-2694] N86-17914
DISTRIBUTION FUNCTIONS
Aspects of turbulence in nonlinear systems, year one
[DE85-016253] N86-18188
DIURNAL VARIATIONS
Monthly infrared imagery enhancement curves: A tool for nighttime sea fog identification off the New England Coast
[PB85-237725] N86-17966
DIVERGENCE
Estimation of divergence and flutter boundaries on supersonic plate wing models from subcritical random responses due to air turbulence
[NAL-TR-856] N86-17308
DIVIDING (MATHEMATICS)
Implementation of a new primality test — prime numbers
[CWI-CS-R8505] N86-18093
DOCUMENTATION
Hanford 1964 atmospheric boundary layer experiment: Micrometeorological and tracer data archive. Set 002 documentation report
[PB85-243145] N86-17963
Propositions to implement a computerized private document retrieval system. Presentation of the Personalized Documentation Aid Tool (OPAD)
[ENST-85E001] N86-18248
DOCUMENTS
Sources of information on engineering geology and related topics for northeastern Illinois
[PB85-241933] N86-17948
DOMAIN WALL
New example of superconducting walls in the ferromagnet ErRh4B4
[DE85-018398] N86-18224
DOMESTIC ENERGY
Multiprimary winding inverter with low harmonic content N86-17439
DOPPLER EFFECT
Measurement of velocity of object moving near large reflecting surface N86-17649
DOSIMETERS
Neutron dosimetry intercomparison at the National Physics Laboratory
[NPL-RS(EXT)-79] N86-18135
An automated charge monitoring system for the NPL linear accelerator
[NPL-RS(EXT)80] N86-18136
DRIFT RATE
Two and three dimensional particle simulation models for study of plasma microinstabilities
[DE86-000238] N86-18201
DRILLING
Machine imparting complex rotary motion for lapping a spherical inner diameter
[DE85-017790] N86-17754
Sandia geothermal technology program: Interactions with other DOE research and CSDP
[DE85-017814] N86-17882
DUCTED FLOW
One-dimensional prediction of the interface motion separating two immiscible fluids enclosed in a long duct
[PDR/CFDU/IC/19] N86-17690
DUCTILITY
The influence of heat affected zone microstructures on the ductility and hydrogen embrittlement of 9 percent Cr 1 percent Mo steel
[AERE-R-11473] N86-17564
DUCTS
Laminar forced convective heat transfer of power law fluids in isosceles triangular ducts with peripheral wall conduction N86-17659
DUNES
Multiwell Experiment Geophysics Program
[DE86-001147] N86-17940
DYE LASERS
Intense excitation source of blue-green laser
[AD-A160303] N86-17733
DYES
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981
DYNAMIC MODELS
Effect of dynamic stall and elastic parameters on the fundamental mechanisms of helicopter vibrations
[AD-A160022] N86-17355
Towards digital computer simulation of the dynamics of flexible spacecraft
[NLR-TR-83106-U] N86-17376
Exact continuous models of Pulse Width Modulation (PWM) regulators in both continuous and discontinuous conduction modes — spacecraft power supplies N86-17459
DYNAMIC RESPONSE
Nonlinear systems: An introduction to describing functions
[ESDU-84009] N86-18058
DYNAMIC STRUCTURAL ANALYSIS
Engineering characterization of ground motion. Task 2: Effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects
[TI85-901169] N86-17796
DYNAMICAL SYSTEMS
A generalized diagram for various parameter estimation methods; the coherence in pseudo-linear regression schemes
[ER-83/07] N86-18095
DYNAMO THEORY
Cyclic mean flows in the Sun as a probe of the dynamo action N86-18259

E

EAR PROTECTORS
Application of active noise reduction for hearing protection and speech intelligibility improvement
[IZF-1985-7] N86-18131
EARPHONES
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704
EARTH ATMOSPHERE
The Earth's atmosphere: Ideas old and new
[RAE-TM-SPACE-351] N86-17931
EARTH CRUST
Sandia geothermal technology program: Interactions with other DOE research and CSDP
[DE85-017814] N86-17882
EARTH MOVEMENTS
Engineering characterization of ground motion. Task 2: Effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects
[TI85-901169] N86-17796
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 2: Lithospheric structure, seismicity, and contemporary deformation of the United States Cordillera
[NASA-CR-176499] N86-17929
EARTH OBSERVATIONS (FROM SPACE)
CNPq/INPE-LANDSAT system
[E86-10019] N86-17814
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815
EARTH ORBITS
Radiation exposure and performance of multiple burn LEO-GEO orbit transfer trajectories N86-17417
EARTH RESOURCES
Sources of information on engineering geology and related topics for northeastern Illinois
[PB85-241933] N86-17948
EARTHQUAKES
Engineering characterization of ground motion. Task 2: Effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects
[TI85-901169] N86-17796
Tsunamis in Peru-Chile
[PB85-247815] N86-17973
ECONOMIC ANALYSIS
Field test of an autonomous wind-diesel power plant
[BMFT-FB-T-85-092] N86-17892
ECONOMIC IMPACT
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909
ECONOMICS
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
EDDY CURRENTS
Calculations of transient fields in the Felix experiments at Argonne using null field integrated techniques
[DE85-017617] N86-17599
EDITING ROUTINES (COMPUTERS)
The VIDEDP manual
[FOA-C-10212-M4] N86-18041
EDUCATION
Activities report in remote sensing training N86-17830
Computer-managed instruction: Crystallized and fluid intelligence
[AD-A160017] N86-18013
EFFECTS
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472
EFFICIENCY
Experimental results on a low-temperature magnetic refrigerator
[DE85-017541] N86-17583
Space Photovoltaic Research and Technology 1985: High Efficiency, Space Environment, and Array Technology
[NASA-CP-2408] N86-17839
Vacuum MOCVD fabrication of high efficience cells N86-17848
Expedient methods of respiratory protection. 3: Submicron particle tests and summary of quality factors
[TI85-018278] N86-17983
EIGENVALUES
Calculations of transient fields in the Felix experiments at Argonne using null field integrated techniques
[DE85-017617] N86-17599
Direction of arrival estimation of eigenstructure methods with unknown sensor gain and phase
[AD-A160027] N86-18065
Predictor-corrector methods for periodic second-order initial value problems
[CWI-NM-R8509] N86-18090
ELASTIC DAMPING
Wave propagation in thick damped laminated plates
[AASU-344] N86-17787
ELASTIC PROPERTIES
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
ELASTIC SCATTERING
Group representation matrix and scattering from nuclei
[DE85-017527] N86-18139
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
Large-t elastic scattering and diffraction dissociation
[NIKHEF-H/85-4] N86-18163
ELASTIC WAVES
Elastic wave gyrometer
[REPT-26/5052] N86-17724
ELASTOMERS
Elastomeric Barrier Pulse Motors N86-17385
ELASTOSTATICS
Formulation of a one-dimensional boundary integral equation for three-dimensional elastostatic corner problems
[PREPRINT-886] N86-18083
ELECTRIC BATTERIES
Method for sensing and measuring a concentration or partial pressure of a reactant used in a redox reaction
[DE85-017740] N86-17630

Electrochemical storage and conversion: Batteries and fuel cells
[DE85-018177] N86-17886
Hybrid gas/electric vehicle
[DE85-016736] N86-18254

ELECTRIC BRIDGES
Calculation methods for short-circuit currents in three-phase bridge rectifier circuits N86-17444

ELECTRIC CHARGE
Effect of charge and aerodynamic properties of particles on electrified fabric filtration
[DE86-000013] N86-17628

ELECTRIC CHOPPERS
Recovery circuit for snubber energy in power electronic applications with high switching frequencies N86-17451

ELECTRIC CONDUCTORS
Correlation and collective modes in narrow band materials
[AD-A160310] N86-18210

ELECTRIC CONTACTS
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880

ELECTRIC CORONA
Discharge detection in high voltage flight hardware N86-17457

ELECTRIC CURRENT
An experimental verification of predicted current and voltage waveforms in a three-phase full-wave rectified bridge circuit with source resistance and inductance when driving a purely resistive load --- permanent magnet alternator
[RAE-TR-83084] N86-17616

ELECTRIC DIPOLES
The interaction between electric dipoles and waveguiding surfaces at optical frequencies N86-18178

ELECTRIC DISCHARGES
Study of surface discharges
[ONERA-RF-10/7236-PY] N86-17639

ELECTRIC FIELDS
Surface potential monitor --- spacecraft surfaces
[SEP-TS/SE/RE/10418/84] N86-17378
The nature of charge carriers in electrorheological suspensions
[BR97662] N86-17500
SAPIENS memo 9: The dependance of the electric field on the inductance of the termination --- of an electromagnetic pulse (EMP) simulator
[FOA-C-30399-A3] N86-17606
Effect of charge and aerodynamic properties of particles on electrified fabric filtration
[DE86-000013] N86-17628
Radiation damage in high-resistivity silicon solar cells N86-17856
Measuring the electric field in the atmosphere in connection with investigations on the dispersion of air pollution
[S/T-REPT-VOL-2-NO-10] N86-17924
Generation of magnetic field aligned currents, parallel electric fields, and inverted-V structures by plasma pressure inhomogeneities in the magnetosphere
[KGI-PREPRINT-073] N86-17941
Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device
[DE85-018139] N86-18190

ELECTRIC GENERATORS
Study of a resonant converter using power transistors in a 25 kW X-ray tube power supply N86-17466

ELECTRIC HYBRID VEHICLES
Hybrid gas/electric vehicle
[DE85-016736] N86-18254

ELECTRIC MOTOR VEHICLES
Research, development, and demonstration of nickel-iron batteries for electric vehicle propulsion
[DE86-000520] N86-17629

ELECTRIC POTENTIAL
Surface potential monitor --- spacecraft surfaces
[SEP-TS/SE/RE/10418/84] N86-17378
An experimental verification of predicted current and voltage waveforms in a three-phase full-wave rectified bridge circuit with source resistance and inductance when driving a purely resistive load --- permanent magnet alternator
[RAE-TR-83084] N86-17616
Automatic crack length measurements by the electrical potential drop method with computer control
[VTH-LR-309] N86-17805
PASP: A high voltage array experiment N86-17863
Continuous measurement of sodium aerosols in the air N86-17894

ELECTRIC POWER PLANTS
Field test of an autonomous wind-diesel power plant
[BMFT-FB-T-85-092] N86-17892
Channel design for closed cycle MHD
[NLR-MP-84053-U] N86-18205

ELECTRIC POWER SUPPLIES
PASP: A high voltage array experiment N86-17863

ELECTRIC POWER TRANSMISSION
High-voltage measurements using digital techniques
[S/T-REPT-VOL-2-NO-8] N86-17636

ELECTRIC PROPULSION
Solar thermal propulsion for planetary spacecraft N86-17423
Analysis of electric propulsion concepts for near-term mission application N86-17424
Thermal arcjet technology for space propulsion N86-17427
Microwave electric propulsion for orbit transfer applications N86-17429
Research, development, and demonstration of nickel-iron batteries for electric vehicle propulsion
[DE86-000520] N86-17629

ELECTRIC SWITCHES
Design and development of a current limited solid state hybrid switch --- spacecraft power supplies N86-17464

ELECTRIC WIRE
Determination of the susceptibility of silver-plated copper wire/cable to red plague corrosion
[ESA-PSS-01-720-ISSUE-1] N86-17554

ELECTRICAL ENGINEERING
Proceedings of ESA sessions at the 16th IEEE Annual Power Electronics Specialists Conference --- spacecraft power supplies
[ESA-SP-230] N86-17432
The Giotto power supply subsystem N86-17436
The ERS-1 power system N86-17437
Designing high frequency ac inductors using ferrite and Molypermalloy Powder Cores (MPP) N86-17452
Activities report of the Department of Engineering N86-18255

ELECTRICAL MEASUREMENT
Discharge detection in high voltage flight hardware N86-17457
Modeling and implementation of a digitally controlled power converter using duty ratio quantization --- spacecraft power supplies N86-17461
An experimental verification of predicted current and voltage waveforms in a three-phase full-wave rectified bridge circuit with source resistance and inductance when driving a purely resistive load --- permanent magnet alternator
[RAE-TR-83084] N86-17616
High-voltage measurements using digital techniques
[S/T-REPT-VOL-2-NO-8] N86-17636
Measuring the electric field in the atmosphere in connection with investigations on the dispersion of air pollution
[S/T-REPT-VOL-2-NO-10] N86-17924

ELECTRICAL RESISTIVITY
Feasibility study of a device to control aircraft electromagnetic protection --- transparence
[ONERA-RS-10/3466-PY] N86-17637
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Radiation damage in high-resistivity silicon solar cells N86-17856
New example of superconducting walls in the ferromagnet ErRh4B4
[DE85-018398] N86-18224

ELECTRO-OPTICS
Integrated optoelectronic circuits and their modular designs for residue number computation N86-17614
Crossing channel waveguide electro-optic modulators N86-18176

ELECTROACOUSTIC WAVES
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128

ELECTROCHEMICAL CELLS
Power switching cell modeling: An easy way --- spacecraft power supplies N86-17460
Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625

ELECTROCHEMICAL CORROSION
The effects of surface pretreatment and nitrogen tetroxide purification on the corrosion rate of Type 304L stainless steel N86-17396
Investigation of electrochemical corrosion of semiconductors
[DE85-016853] N86-17541
Localized electrochemical corrosion of nickel based alloys
[DE86-000521] N86-17545
Spectral analysis and metallographic investigations of corrosion and precipitation products of high temperature alloys
[JUEL-1975] N86-17553
Determination of the susceptibility of silver-plated copper wire/cable to red plague corrosion
[ESA-PSS-01-720-ISSUE-1] N86-17554
Influence of corrosion pits and environmental moisture on the fatigue behavior of 35 NCD 16 THR-ESR
[M3-450900] N86-17555

ELECTROCHEMICAL OXIDATION
Reduction of aliphatic nitrocompounds on nonoxidised and oxidised carbon fibre electrodes
[BR97661] N86-17471

ELECTROCHEMISTRY
Improvement of the process for electrochemical impregnation of nickel hydroxide electrodes --- nickel cadmium batteries N86-17447
Electrochemical behavior of graphite fiber-polymer composites
[AD-A160031] N86-17478
The role of solvent reorganization dynamics in electron-transfer processes. Theory-experiment comparisons for electrochemical and homogeneous electron exchange involving metallocene redox couples
[AD-A160034] N86-17504

ELECTRODES
Reduction of aliphatic nitrocompounds on nonoxidised and oxidised carbon fibre electrodes
[BR97661] N86-17471
Electrochemical behavior of graphite fiber-polymer composites
[AD-A160031] N86-17478
Surface-enhanced raman spectroscopy as a probe of adsorbate-surface bonding: Simple alkenes and alkynes adsorbed at gold electrodes
[AD-A160033] N86-17503
The role of solvent reorganization dynamics in electron-transfer processes. Theory-experiment comparisons for electrochemical and homogeneous electron exchange involving metallocene redox couples
[AD-A160034] N86-17504
Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625
Disorder and transport in lithium/aluminum
[DE85-018389] N86-18231

ELECTROLYSIS
Raman spectroscopic study of molten salt electrolysis of light metals
[DE85-017480] N86-17509

ELECTROLYTES
Investigation of electrochemical corrosion of semiconductors
[DE85-016853] N86-17541
Method for sensing and measuring a concentration or partial pressure of a reactant used in a redox reaction
[DE85-017740] N86-17630

ELECTROMAGNETIC ABSORPTION
Feasibility study of a device to control aircraft electromagnetic protection --- transparence
[ONERA-RS-10/3466-PY] N86-17637

ELECTROMAGNETIC COMPATIBILITY
USSR report: Electronics and electrical engineering
[JPRS-UEE-84-016] N86-17640

ELECTROMAGNETIC FIELDS
Calculations of transient fields in the Felix experiments at Argonne using null field integrated techniques
[DE85-017617] N86-17599
Electromagnetic pulse (EMP): Exposure of missile 56 in EMP simulator sapiens
[FOA-C-30398-A3] N86-17605
Detailed design of a 13 kA 13 kV dc solid-state turn-off-switch
[DE85-013874] N86-17623
Determining spatial orientation of axes of elliptical magnetic field N86-17652
Magnetic field of excitation winding in experimental cryogenic turbogenerator N86-17653
GRAPS: Graphical Plotting System
[AD-A159808] N86-17821
Fast magnetic systems, basic research
[BMFT-FB-T-85-102] N86-18117

ELECTROMAGNETIC INTERACTIONS
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes
[AD-A158468] N86-17533

ELECTROMAGNETIC INTERFERENCE
The Physikalisch-Technische Bundesanstalt (PTB) test regulations. Immunity from disturbance. Methods to test the influence of electromagnetic disturbances on measuring equipment
[ISSN-0341-7964] N86-17592
Feasibility study of a device to control aircraft electromagnetic protection --- transparence
[ONERA-RS-10/3466-PY] N86-17637

ELECTROMAGNETIC MEASUREMENT
Feasibility study of a device to control aircraft electromagnetic protection --- transparence
[ONERA-RS-10/3466-PY] N86-17637

ELECTROMAGNETIC PULSES
Electromagnetic pulse (EMP): Exposure of missile 56 in EMP simulator sapiens
[FOA-C-30398-A3] N86-17605
SAPIENS memo 9: The dependance of the electric field on the inductance of the termination --- of an electromagnetic pulse (EMP) simulator
[FOA-C-30399-A3] N86-17606
ELECTROMAGNETIC RADIATION
The scattering of Gaussian beams incident on a transmitting layer configuration N86-17589
Characterization of the electromagnetic radiation preceding lightning
[ONERA-NT-1985-1] N86-17960
ELECTROMAGNETIC SHIELDING
The design of shielded enclosures, especially for high-voltage laboratories
[S/T-REPT-VOL-2-NO-11] N86-17360
ELECTROMAGNETS
An experimental verification of predicted current and voltage waveforms in a three-phase full-wave rectified bridge circuit with source resistance and inductance when driving a purely resistive load --- permanent magnet alternator
[RAE-TR-83084] N86-17616
ELECTROMECHANICAL DEVICES
A CSMP commutation model for design study of a brushless dc motor power conditioner for a cruise missile fin control actuator
[AD-A159855] N86-17621
ELECTROMECHANICS
UHV piezoelectric translator
[DE85-018201] N86-17627
ELECTRON BEAMS
Damage-rate gradient effects on radiation-induced segregation and phase stability in irradiated alloys
[DE85-016605] N86-17540
Brightness measurements on the Livermore high brightness test stand
[DE86-000016] N86-18157
Study of optical transition radiation produced by 30 to 70 MeV energy electrons: Application to the diagnostics of beams with charged particles. Chapter 2: Description of the experimental device. Chapter 6: Experiments with transition radiation interference
[DE86-001258] N86-18158
ELECTRON BOMBARDMENT
Burst annealing of electron damage in silicon solar cells N86-17853
ELECTRON CYCLOTRON HEATING
Experimental studies of radio frequency waves and confinement in the Auburn Torsatron
[DE85-017189] N86-18199
ELECTRON DENSITY (CONCENTRATION)
Drift modes with differential rotation and passing electrons
[DE85-017243] N86-18151
ELECTRON GUNS
Design and performance of large area monolithic electron guns for the Aurora KrF laser system
[DE85-014112] N86-17734
ELECTRON IRRADIATION
Performance of Hughes GaAs concentrator cells under 1-MeV electron irradiation N86-17860
ELECTRON PARAMAGNETIC RESONANCE
Effects of high energy radiation on the mechanical properties of epoxy-graphite fiber reinforced composites
[NASA-CR-176487] N86-17476
ELECTRON RADIATION
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854
ELECTRON SCATTERING
Density gradient free electron collisionally excited X-ray laser
[DE85-017726] N86-17739
ELECTRON SPECTROSCOPY
An intercomparison of measurements of the beta spectra of 90Sr-90Y
[NPL-RS(EXT)77] N86-18134
ELECTRON STATES
Absolute wavelength measurement and fine structure determination in (7)Li 2
[DE85-018382] N86-18235
ELECTRON TRANSFER
The role of solvent reorganization dynamics in electron-transfer processes. Theory-experiment comparisons for electrochemical and homogeneous electron exchange involving metallocene redox couples
[AD-A160034] N86-17504
ELECTRON TRANSITIONS
The red band spectrum of gaseous CaH. Molecular equilibrium ground state constants. Term values of the A(2)Pi, B(2)Sigma, and X(2)Sigma states
[USIP-85-13] N86-18164
ELECTRON TUNNELING
Quantum resonances in physical tunneling
[DE85-017558] N86-18214
ELECTRONIC EQUIPMENT
USSR report: Electronics and electrical engineering
[JPRS-UEE-84-016] N86-17640
ELECTRONIC EQUIPMENT TESTS
The application of sensors in light tests
[NLR-MP-84056-U] N86-17352
The Physikalisch-Technische Bundesanstalt (PTB) test regulations. Immunity from disturbance. Methods to test the influence of electromagnetic disturbances on measuring equipment
[ISSN-0341-7964] N86-17592
ELECTRONIC TRANSDUCERS
Development of sensors on the basis of polycrystalline silicon
[BMFT-FB-T-85-068] N86-17720
ELECTRONS
Magnetic charge and non-associative algebras
[DE85-009931] N86-18068
Drift modes with differential rotation and passing electrons
[DE85-017243] N86-18151
Theoretical investigations of metal surfaces N86-18206
ELECTROPHORESIS
Protein mapping and the problem of complexity in molecular biology
[DE85-018349] N86-17979
ELECTROPHOTOMETERS
CCD photometry of galactic clusters containing Cepheid variables. Paper 3: Photometry and identification charts for NGC 6067 N86-18276
ELECTROPLATING
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801
ELECTROSTATIC CHARGE
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115
ELECTROSTATIC WAVES
Generation of magnetospheric radiation by decay of Bernstein waves
[KGI-PREPRINT-076] N86-17942
Waves with harmonic structure below and above the Lower Hybrid Resonance (LHR) observed on the Cleft Energetics Transport and Ultraviolet Radiation (CENTAUR) 35.001 and 35.002 rockets
[DRI-2-85] N86-17946
ELECTROTHERMAL ENGINES
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426
ELEMENTARY PARTICLE INTERACTIONS
Recent results of the study of photon-photon collisions
[DE85-018110] N86-18140
Theoretical investigations of metal surfaces N86-18206
ELLIPTIC DIFFERENTIAL EQUATIONS
Difference methods of higher order for elliptic boundary value problems with curved boundaries
[TUM-I8411] N86-18059
EMERGENCY BREATHING TECHNIQUES
Expedient methods of respiratory protection. 3: Submicron particle tests and summary of quality factors
[TI85-018278] N86-17983
EMISSION
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909
EMISSION SPECTRA
Generation of magnetospheric radiation by decay of Bernstein waves
[KGI-PREPRINT-076] N86-17942
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137
Correlated variability in the W49N water maser source N86-18264
EMITTANCE
Measurement of thermo-optical properties of thermal control materials
[ESA-PSS-01-709-ISSUE-1] N86-17375
Total normal emittance measurements of highly conductive, opaque materials using a solar furnace
[DE85-016578] N86-17508
Method of measuring emittance of thermal insulation materials at low temperatures N86-17650
EMITTERS
Further research on high open circuit voltage in silicon solar cells N86-17842
ENERGY ABSORPTION FILMS
Thin film coatings for improved alpha/epi N86-17867
ENERGY CONSERVATION
Activities report in applied physics N86-18119
ENERGY CONSUMPTION
Spacecraft Orbital Power Evaluation (SCOPE) N86-17442
MATPWR: A mission analysis tool for LEO spacecraft power profiles computation N86-17469
ENERGY CONVERSION
Recovery circuit for snubber energy in power electronic applications with high switching frequencies N86-17451
Field test of an autonomous wind-diesel power plant
[BMFT-FB-T-85-092] N86-17892
ENERGY CONVERSION EFFICIENCY
Further research on high open circuit voltage in silicon solar cells N86-17842
Gallium arsenide solar cell efficiency: Problems and potential N86-17843
N/P GaAs concentrator solar cells with an improved grid and bushbar contact design N86-17844
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
ENERGY DISSIPATION
Viscosity, granular-temperature and stress calculations for shearing assemblies of inelastic: Frictional disks
[DE85-015173] N86-17794
ENERGY DISTRIBUTION
Metrological provision for measurement of relative energy density distribution over beam cross section and of beam divergence in pulse lasers N86-17643
Multichannel commutators of analog signals for measurement of energy distribution over beam cross section of pulse laser N86-17644
The 400-channel commutator for measurement of energy distribution in laser beam N86-17645
Dependence of error of measurement of relative energy or power density distribution over cross section of laser beam on space factor of multielement radiation transducer N86-17646
Photoelectric instrument for measuring relative energy density distribution in beams of pulse lasers N86-17647
Space station power management and distribution N86-17869
ENERGY GAPS (SOLID STATE)
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
A possible radiation-resistant solar cell geometry using superlattices N86-17851
Cell Research and Technology Workshop N86-17870
ENERGY POLICY
Efficiency calculation for gas turbines: Searching for simple relations between thermodynamic efficiency of a gas turbine and efficiency determining parameters
[SS-44] N86-17766
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875
Sandia geothermal technology program: Interactions with other DOE research and CSDP
[DE85-017814] N86-17882
Predicting windspeed: A system theoretical approach
[REPT-49] N86-17961
Activities report in applied physics N86-18119
Energy Data Base: Introduction to content and structure, revision 1
[DE84-017165] N86-18244
ENERGY SPECTRA
Correlation and collective modes in narrow band materials
[AD-A160310] N86-18210
ENERGY TECHNOLOGY
Proceedings of ESA sessions at the 16th IEEE Annual Power Electronics Specialists Conference --- spacecraft power supplies
[ESA-SP-230] N86-17432
Development of silicon nitride materials for casting of solar cell silicon
[BMFT-FB-T-85-069] N86-17577
Test and operation program STEP 100 (German-Australian solar power plant in Meekatharra, Western Australia)
[BMFT-FB-T-85-077] N86-17887
ENERGY TRANSFER
Development of solid state vibrational lasers
[AD-A159817] N86-17732
ENGINE DESIGN
Design optimization for a space based, reusable orbit transfer vehicle N86-17418
The effect of engine design characteristics on orbital transfer vehicle performance N86-17419
Solar thermal rocket design and fabrication N86-17428

ENGINE FAILURE
Estimation of drag due to inoperative turbo-jet and turbo-fan engines using data item nos. 81009 and 84004
[ESDU-84005] N86-17305
Fault analysis in dynamic systems with application to reciprocating combustion engines N86-17746
ENGINE MONITORING INSTRUMENTS
Thrust measurements for ramjet performance documentation N86-17401
ENGINE TESTS
Small, two-stage, partial-admission turbine N86-17386
ENGINEERING MANAGEMENT
Sources of information on engineering geology and related topics for northeastern Illinois
[PB85-241933] N86-17948
ENTROPY
Differential metrics in probability spaces based on entropy and divergence measures
[AD-A160301] N86-18066
ENVIRONMENT EFFECTS
Space Environment Workshop N86-17871
ENVIRONMENT PROTECTION
Environment-friendly propeller aircraft with a maximum weight of 5700 kg, and motor gliders: Publication of the noise values N86-17341
ENVIRONMENT SIMULATION
Photosimulation of target acquisition in the presence of smoke: A pilot study
[IZF-1984-36] N86-17986
ENVIRONMENT SIMULATORS
Fluid modeling of flow and dispersion in the atmosphere: Facilities and techniques --- air pollution N86-17902
ENVIRONMENTAL MONITORING
Operational considerations in monitoring oxygen levels at the National Transonic Facility
[NASA-CR-3953] N86-17359
Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
[MBL-1985-6] N86-17980
ENVIRONMENTAL QUALITY
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926
EPOXY MATRIX COMPOSITES
A review of the physical ageing of epoxy resins and their carbon fibre composites
[RAE-TM-1051(MAT/STR)] N86-17473
Effect of carbon fiber surface treatment on moisture absorption and interlaminar shear strength of carbon fibre/epoxy resin composites
[RAE-TR-84047] N86-17474
Electrochemical behavior of graphite fiber-polymer composites
[AD-A160031] N86-17478
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites
[OUEL-1579/85] N86-17481
Relationship between components and performance of composite materials. Part 1: BSL914 matrix systems --- carbon fiber-epoxy
[ONERA-RT-1/3636-M-PT-1] N86-17488
EPOXY RESINS
A review of the physical ageing of epoxy resins and their carbon fibre composites
[RAE-TM-1051(MAT/STR)] N86-17473
Effect of carbon fiber surface treatment on moisture absorption and interlaminar shear strength of carbon fibre/epoxy resin composites
[RAE-TR-84047] N86-17474
The hardening of technical adhesives
[CETIM-101370] N86-17576
The use of ultrasonic wave attenuation to monitor polymer and composite quality
[AERE-R-11704] N86-17777
EQUIPMENT SPECIFICATIONS
The application of sensors in light tests
[NLR-MP-84058-U] N86-17352
EQUIVALENT CIRCUITS
Equivalent-circuit calculations for built-up magnetic structures by projection method N86-17655
ERGODIC PROCESS
Ultraviolet problem and analytical properties of classical field theories
[PREPRINT-451] N86-18239
ERROR ANALYSIS
Critical analysis of turbulence restitution from acceleration measurements --- aircraft construction
[ONERA-RT-3/3567-RY-C40-R] N86-17340
Error propagation in a digital avionic processor: A simulation-based study
[NASA-CR-176501] N86-17351
Dependence of error of measurement of relative energy or power density distribution over cross section of laser beam on space factor of multielement radiation transducer N86-17646
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019
ERROR CORRECTING CODES
A systolic array implementation of a Reed-Solomon encoder and decoder
[AD-A159824] N86-18011
ERROR DETECTION CODES
On the garbage collection of block structured memories
[RSRE-85006] N86-18043
ERROR FUNCTIONS
Uncorrelated noise in turbulence measurements
[PB85-212314] N86-17968
ERRORS
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019
ERS-1 (ESA SATELLITE)
The ERS-1 power system N86-17437
Applications and scientific uses of ERS-1 radar altimeter data
[ESA-CR(P)-2084] N86-17823
A study of ERS-1 radar altimeter data processing requirements
[ESA-CR(P)-2073] N86-18028
ESTIMATES
Estimation of divergence and flutter boundaries on supersonic plate wing models from subcritical random responses due to air turbulence
[NAL-TR-856] N86-17308
Estimation of flaw size in ultrasonic testing of welds in unalloyed and low-alloy steels
[BLL-RISLEY-TR-5229-(9091.9F)] N86-17782
A generalized diagram for various parameter estimation methods; the coherence in pseudo-linear regression schemes
[ER-83/07] N86-18095
How many bootstraps?
[AD-A160043] N86-18106
ESTIMATING
Estimation of sea-surface windspeed from whitecap cover: Statistical approaches compared empirically and by simulation
[AD-A159816] N86-17969
Direction of arrival estimation of eigenstructure methods with unknown sensor gain and phase
[AD-A160027] N86-18065
On the asymptotic properties of a kernel-type quantile estimator from censored samples
[AD-A160302] N86-18108
ETHYL ALCOHOL
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
EULER EQUATIONS OF MOTION
Multigrid solution of the steady Euler equations
[CWI-NM-R8505] N86-17696
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699
Integrability of two interacting N-dimensional rigid bodies
[PREPRINT-450] N86-18079
EULER-LAGRANGE EQUATION
Lagrangian modeling of turbulent dispersion --- air pollution N86-17901
EUROPE
Deposition of sulfur in Europe: Methods to construct unbiased source-receptor matrices from data of a limited period (1976 - 1982). A meteorological contribution to the IIASA Regional Acidification Information and Simulation (RAINS) model
[KNMI-TR-66] N86-17923
EUROPEAN COMMUNICATIONS SATELLITE
MARECS and ECS: The first few years in orbit --- power subsystems N86-17433
EUROPEAN SPACE AGENCY
The ESA preferred parts list
[ESA-PSS-01-603] N86-17634
EUROPEAN SPACE PROGRAMS
Study of user segment of Navsat
[ESA-CR(P)-2089] N86-17332
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-1] N86-17365
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-2] N86-17366
A program for International Polar Oceans Research (PIPOR)
[ESA-SP-1074] N86-17972
Ad astra HIPPARCOS. The European Space Agency's astrometry mission
[ESA-BR-24] N86-18282
EVALUATION
Evaluation of functional experience with safety valves
[BMI-1985-080] N86-17760
Characterizing software with objective measurements
[AD-A160018] N86-18014
EVAPOTRANSPIRATION
Hydrological description of a study area around pump station 't Klooster (the Netherlands); application of hydrological models and remote sensing
[NOTA-1542] N86-17831
EVENTS
Results of solar research studies at the Metsaehovi (Finland) radio research station N86-18260
EXCAVATION
Rock failure criteria for design of underground structural supports
[AD-A159807] N86-17932
EXCIMER LASERS
Excimer laser phototherapy for the dissolution of abnormal growth
[DE85-017803] N86-17741
EXCITATION
Density gradient free electron collisionally excited X-ray laser
[DE85-017726] N86-17739
EXHAUST EMISSION
Development of low-emission gas turbine combustion systems
[BMFT-FB-T-85-064] N86-17763
EXOTHERMIC REACTIONS
Physical chemical tests and feasibility study of the Ciba-Geigy R6376 IM8 prepreg --- fiber reinforced composites
[DGT-26.749] N86-17484
Self-propagating reactions for synthesis of high temperature materials
[AD-A159869] N86-17535
EXPERIMENTATION
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
EXPERT SYSTEMS
Expert systems for design and simulation
[DE85-017565] N86-18053
EXPLOSIVE WELDING
Static and fatigue strength of explosion welded plates
[BLL-RISLEY-TR-5232-(9091.9F)] N86-17784
EXPLOSIVES
A reference survey of pyrolysis of explosives
[FOA-C-20580-D1] N86-17581
EXPONENTIAL FUNCTIONS
The indexing properties of an ancillary statistic
[AD-A160030] N86-18105
EXPOSURE
Assessment of individual human exposures to ozone in a health study
[PB85-245975] N86-17984
EXTRAGALACTIC RADIO SOURCES
Observations of extragalactic radio sources at 8 and 13.5 mm N86-18269
EXTREMELY HIGH FREQUENCIES
A single-balanced mixer for the Ka band
[FOA-C-30407-E] N86-17638
EXTRUDING
Structure-property studies in the deformation of semi-crystalline polymers N86-17565

F

FABRICATION
Sputter deposition system for controlled fabrication of multilayers
[DE85-017521] N86-17582
A method of fabricating silicon carbide mouldings
[BLL-RISLEY-TR-5206-(9091.9F)] N86-17747
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880
FACE CENTERED CUBIC LATTICES
High strain rate deformation in FCC metals and alloys
[DE85-017533] N86-17536
FACTORIAL DESIGN
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017

FACTORIZATION
Numerical analysis for steady transonic flows past an airfoil using AF scheme N86-17289
Analysis of high Reynolds number transonic flow around an airfoil N86-17293
ANOVA model fitting via sparse matrix computations [DE85-017070] N86-18069
Computation of all the amicable pairs below 10 billion [CWI-NM-R8503] N86-18087
FAILURE
Initial results for the failure strength of a LOVA gun propellant at high pressures and various strain rates N86-17402
FAILURE ANALYSIS
Hardware/software Failure Mode Effect Analysis (FMEA) applied to airplane safety [NLR-MP-84073-U] N86-17325
Analysis of a gas generator system N86-17391
IUS propulsion status N86-17415
Test of a measuring instrument composed of two local flow turbines, two drag bodies, a full flow turbine and a two-beam densitometer, of the Large Pressurized Water Reactor Offnormal Behavior Investigation (LOBI) instrumentation in a transient two-phase flow [KFK-3877] N86-17694
Analysis of a gas generator system [AD-A156999] N86-17749
An approach to the quantification of seismic margins in nuclear power plants [TI85-017151] N86-17934
FAILURE MODES
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites [OUEL-1578/85] N86-17480
Slow crack growth: Macroscopic and microscopic aspects [DE85-011165] N86-17798
FAINT OBJECT CAMERA
Software quality metrics of the Faint Object Camera (FOC) image processing software [ESA-CR(P)-2039] N86-17716
FAR INFRARED RADIATION
Heat image generators: State of affairs by the exploration of some possibilities [IZF-1985-15] N86-17723
FARADAY EFFECT
Measurement of Faraday rotation in twisted optical fiber using rotating polarization and analog phase detection [DE85-015704] N86-17737
FASTENERS
Fatigue rated fastener systems in aluminum alloy structural joints — aircraft structures [NLR-MP-83045-U] N86-17809
FATIGUE (MATERIALS)
Lecture notes on fatigue, static tensile strength and stress corrosion of aircraft materials and structures. Part 2: Figures [VTH-LR-360-PT-2] N86-17345
Closure of fatigue cracks at high strains [NASA-CR-175021] N86-17788
FATIGUE TESTS
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 1: Background and fatigue evaluation [RAE-TR-84084] N86-17336
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 2: Final definition of Helix and Felix [RAE-TR-84085] N86-17337
Fatigue performance of prestressed composite pressure vessels [SNIAS-852-430-114] N86-17494
Metallurgical and assembling fatigue characterization of the alloys 2214T451, 7010T73651 and 2024T351 in plates (50 to 70 mm, 120 to 125 mm) and in thick forged bars [DGT-25.919] N86-17552
Influence of corrosion pits and environmental moisture on the fatigue behavior of 35 NCD 16 THR-ESR [M3-450900] N86-17555
Study of the influence of pitting corrosion on the fatigue characteristics of Marvac 18 [M2-666500] N86-17556
Fatigue in a welded join made by pulsed MIG welding of a 304 type stainless steel [BLL-RISLEY-TR-5233-(9091.9F)] N86-17783
Static and fatigue strength of explosion welded plates [BLL-RISLEY-TR-5232-(9091.9F)] N86-17784
Automatic crack length measurements by the electrical potential drop method with computer control [VTH-LR-309] N86-17805
Fatigue rated fastener systems in aluminum alloy structural joints — aircraft structures [NLR-MP-83045-U] N86-17809
FAULT TOLERANCE
Fault analysis in dynamic systems with application to reciprocating combustion engines N86-17746
Research in computer science [NASA-CR-176486] N86-17998
Performance and reliability analysis using directed acyclic graphs [AD-A160313] N86-18016
FAULT TREES
IUS propulsion status N86-17415
Probabilistic analysis of fault trees using pivotal decomposition [AD-A159856] N86-18012
FEASIBILITY ANALYSIS
Bio-Observation Subsystem (BOSS) feasibility study — Spacelab [BOSS-010-MT] N86-17362
Space Station Engineering and Technology Development. Proceedings of the Panel on Program Performance and Onboard Mission Control [NASA-CR-176484] N86-17372
Technology achievements and projections for communication satellites of the future [NASA-TM-87201] N86-17595
Simulation of flame acceleration in unconfined vapor cloud explosions [VTT-RR-357] N86-17698
Elastic wave gyrometer [REPT-26/5052] N86-17724
FEEDBACK CONTROL
Compensating structure and parameter optimization for attitude control of a flexible spacecraft [INPE-3564-PRE/770] N86-17371
A control system design approach for flexible spacecraft [NASA-TM-87599] N86-17373
Application of current-control modulator (MC2) control feedback for 12 GHz 20 W Electric Power Conditioner (EPC) for Telecom satellite N86-17455
The biomorphic model of the human pilot [VTH-LR-310] N86-17991
Nonlinear systems: An introduction to describing functions [ESDU-84009] N86-18058
FERRITES
Designing high frequency ac inductors using ferrite and Molypermalloy Powder Cores (MPP) N86-17452
Microwave detector [DE85-017797] N86-17711
FERROMAGNETIC MATERIALS
Development of cobalt-free high grade permanent magnets on the basis of MnAl alloys [BMFT-FB-T-85-099] N86-17559
New example of superconducting walls in the ferromagnet ErRh4B4 [DE85-018398] N86-18224
FERRY SPACECRAFT
Systems analysis of solid fuel nuclear engines in cislunar space [ILR-MITT-142] N86-18171
FIBER COMPOSITES
Low cost carbon/carbon nozzles for solid rocket motors N86-17381
FIBER OPTICS
Construction of a measuring method using fiber optics and an LTN-90 laser gyro strapdown system for BO-195 helicopters [DFVLR-MITT-85-10] N86-17333
Bio-observation subsystem, phase A study, executive summary — Spacelab [REPT-648-DT-6-ISSUE-1] N86-17364
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes [AD-A158468] N86-17533
Improved fiberoptic spectrophotometer [DE85-017792] N86-17710
Measurement of Faraday rotation in twisted optical fiber using rotating polarization and analog phase detection [DE85-015704] N86-17737
Excimer laser phototherapy for the dissolution of abnormal growth [DE85-017803] N86-17741
Applications of fiber optic couplers to diagnostic experiments at the Nevada Test Site [DE85-016787] N86-18181
Review of high bandwidth fiber optics radiation sensors [DE85-017559] N86-18183
Optical switch [DE85-017783] N86-18184
Imaging techniques utilizing optical fibers and tomography [DE85-017536] N86-18186
FIBER ORIENTATION
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites [OUEL-1579/85] N86-17481
FIBER REINFORCED COMPOSITES
Effects of high energy radiation on the mechanical properties of epoxy-graphite fiber reinforced composites [NASA-CR-176487] N86-17476
Metallizing of fiber reinforced composites [MBB-Z-46/48] N86-17482
Physical chemical tests and feasibility study of the Ciba-Geigy R6376 IM6 prepreg — fiber reinforced composites [DGT-26.749] N86-17484
Evaluation of the Ciba-Geigy R6376 IM6 prepreg — fiber reinforced plastics [DGT-26.649] N86-17485
FIBERS
Coupling between plastic scintillators and light fibers for remote detection of X-rays [DE85-016946] N86-17707
FIELD COILS
Fast magnetic systems, basic research [BMFT-FB-T-85-102] N86-18117
FIELD EFFECT TRANSISTORS
Design and development of a current limited solid state hybrid switch — spacecraft power supplies N86-17464
A pulsed 8 W FET power amplifier at 9.4 Ghz [FOA-C-30402-E] N86-17613
GaAs/In/sub 0.25/Ga/sub 0.75As/GaAs, modulation-doped, single, strained quantum-well FET [DE85-018272] N86-18221
FIELD EMISSION
Liquid metal field emission thrusters and ion sources: A review [ESA-CR(P)-2078] N86-17470
FIELD STRENGTH
Reversible component of magnetic induction in magnetically soft materials during magnetization reversal N86-17654
Fast magnetic systems, basic research [BMFT-FB-T-85-102] N86-18117
FIELD THEORY (PHYSICS)
Ultraviolet problem and analytical properties of classical field theories [PREPRINT-451] N86-18239
On the stochastic quantization of field theory [PREPRINT-457] N86-18241
FILAMENT WINDING
Filament winding: An industrial procedure — composite materials [SNIAS-852-430-117] N86-17496
Design of nonaxysymmetric structures (turbojet engine nacelle element) [SNIAS-852-430-119] N86-17498
FILE MAINTENANCE (COMPUTERS)
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs [PB85-248110] N86-17967
A distributed file service based on optimistic concurrency control [CWI-CS-R8507] N86-18251
FILTRATION
Expedient methods of respiratory protection. 3: Submicron particle tests and summary of quality factors [TI85-018278] N86-17983
FINE STRUCTURE
Absolute wavelength measurement and fine structure determination in (7)Li 2 [DE85-018382] N86-18235
FINES
Modification of vulcanized elastomer surfaces to diminish adherence to metals [CETIM-100340] N86-17575
FINITE DIFFERENCE THEORY
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations N86-17273
Direct simulation of the incompressible flow at high Reynolds number by finite difference method N86-17276
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment N86-17278
Numerical analysis of transonic flow around two-dimensional airfoil by solving Navier-Stokes equations N86-17292
An explicit scheme for the prediction of ocean acoustic propagation in three dimensions [AD-A160053] N86-18125
Three dimensional toroidal magnetohydrodynamic particle code [DE86-000239] N86-18202
FINITE ELEMENT METHOD
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena [NASA-CR-176485] N86-17475
finite element analysis of transient forced convection and conjugate heat transfer N86-17660

Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
Quasi three-dimensional finite element flow calculation in pumps N86-17678
Flow calculation in pump impellers by finite elements N86-17679
The dynamics of mechanisms with deformable links
[LAB-REPT-758] N86-17790
The dynamics of mechanisms with deformable links N86-17791
Finite element kinematic analysis of spatial mechanisms N86-17792
TRANSL: A subroutine library for PATRAN-G translators
[DE85-017634] N86-18020
ORION: An interactive color post-processor for two dimensional finite element codes, revision 2
[DE85-017876] N86-18021
Bifurcation and stability, a numerical approach
[NLR-MP-84078-U] N86-18085

FINITE VOLUME METHOD
Inverse method with geometry constraints for transonic airfoil design
[NLR-MP-84069-U] N86-17311

FINNED BODIES
Low-fin staggered tube banks: Heat transfer and pressure-loss for turbulent single-phase crossflow
[ESDU-84016] N86-17664

FIRE CONTROL CIRCUITS
Design and development of a pyrotechnique arming and firing unit --- spacecraft pyrotechnics N86-17465

FIRE DAMAGE
Fast cook-off tests of the AMRAAM air vehicle N86-17389

FIRES
Controlled Impact Demonstration (CID)
[GPO-46-870] N86-17324
Calculating the vulnerability of synthetic polymers to autoignition during nuclear flash
[DE85-016649] N86-17571

FISSION PRODUCTS
New delayed neutron precursors measured at TRISTAN
[DE85-017918] N86-18141

FLAME PROPAGATION
Simulation of flame acceleration in unconfined vapor cloud explosions
[VTT-RR-357] N86-17698

FLAME RETARDANTS
Fast cook-off tests of the AMRAAM air vehicle N86-17389

FLAMMABILITY
Ignition behavior of small hot components in flammable atmospheres
[PTB-W-25] N86-17519

FLASHOVER
Calculating the vulnerability of synthetic polymers to autoignition during nuclear flash
[DE85-016649] N86-17571

FLAT PLATES
Low Reynold's number boundary layers in a disturbed environment
[NASA-CR-175031] N86-17665

FLEXIBLE SPACECRAFT
Compensating structure and parameter optimization for attitude control of a flexible spacecraft
[INPE-3564-PRE/770] N86-17371
A control system design approach for flexible spacecraft
[NASA-TM-87599] N86-17373
Towards digital computer simulation of the dynamics of flexible spacecraft
[NLR-TR-83106-U] N86-17376

FLIGHT CHARACTERISTICS
Results of PRIM gyroscope testing: Conclusions regarding PRIM effects, supplement 1
[DE85-012933] N86-17706

FLIGHT CLOTHING
A waterproof vent valve for immersion suits
[REPT-515] N86-17988

FLIGHT CONTROL
Development of a sensitivity analysis technique for multiloop flight control systems
[NASA-CR-166619] N86-17358
A CSMP commutation model for design study of a brushless dc motor power conditioner for a cruise missile fin control actuator
[AD-A159855] N86-17621
Computer Aided Design (CAD) at the National Aerospace Laboratory (Netherlands) with the accent on aircraft flight control systems
[NLR-MP-84032-U] N86-18030

FLIGHT CREWS
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport
[REPT-1] N86-17985

FLIGHT INSTRUMENTS
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329

FLIGHT MECHANICS
Publications, catalog 1985 N86-18249

FLIGHT PATHS
Three-dimensional flight-path reconstruction by means of spline approximation
[NLR-TR-83091-U] N86-17347

FLIGHT SAFETY
Activities in air traffic control N86-17331

FLIGHT SIMULATION
Fatigue rated fastener systems in aluminum alloy structural joints --- aircraft structures
[NLR-MP-83045-U] N86-17809

FLIGHT SIMULATORS
Plan for evaluation of the training potential of helmet-mounted display and computer-generated synthetic imagery
[AD-A160299] N86-17705

FLIGHT TEST INSTRUMENTS
Construction of a measuring method using fiber optics and an LTN-90 laser gyro strapdown system for BO-195 helicopters
[DFVLR-MITT-85-10] N86-17333
Operational application of the STALINS method for measuring take-off and landing trajectories
[NLR-TR-83010-U] N86-17346
The application of sensors in light tests
[NLR-MP-84056-U] N86-17352

FLIGHT TESTS
The deiced super Puma --- helicopters
[SNIAS-852-210-104] N86-17328
Helicopter-ship qualification testing
[NLR-MP-84062-U] N86-17343
Operational application of the STALINS method for measuring take-off and landing trajectories
[NLR-TR-83010-U] N86-17346
The application of sensors in light tests
[NLR-MP-84056-U] N86-17352
The 2.75 minimum signature barrage rocket N86-17393

FLIR DETECTORS
Heat image generators: State of affairs by the exploration of some possibilities
[IZF-1985-15] N86-17723

FLOW DISTRIBUTION
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations N86-17273
Development of computational fluid dynamics at NASA Ames Research Center N86-17275
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
Validation and comparison with experiment of a high Reynolds number transonic flow airfoil analysis code NSFOIL N86-17294
Studies of the flow field near a NACA 4412 aerofoil at nearly maximum lift
[RAE-TM-AERO-2026] N86-17307
Results for analytical transonic flow patterns with weak shock waves over curved walls with a corner
[STN-9] N86-17319
Horseshoe vortex formation around a cylinder N86-17658
Numerical simulation of flow around circular cylinders at high Reynolds numbers --- offshore structures
[Z-50551] N86-17697

FLOW EQUATIONS
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
Quasi three-dimensional finite element flow calculation in pumps N86-17678
Flow calculation in pump impellers by finite elements N86-17679

FLOW MEASUREMENT
Measurements of the two phase flow in the neighborhood of the exhaust of a 7.62 mm caliber gun
[ISL-R-110/84] N86-17518
Experimental generation of stratified shear flows
[AD-A160304] N86-17668
Investigation of an oblique shock wave/laminar boundary layer interaction using Laser Doppler Velocimetry (LDV)
[VKI-TN-152] N86-17680
Liquid flow calibration --- hydraulic equipment
[CETIM-15-C-251] N86-17691
Models and prediction of turbulent flow with particles
[ONERA-RTS-21/7135-EY] N86-17692
MFTF-B load-flow analysis: A mainframe application implemented on a personal computer
[DE85-018155] N86-18023

FLOW REGULATORS
Performance comparison of thirty, two-stage demand regulators --- underwater breathing apparatus
[ARE(M6)-TM-83818] N86-17987

FLOW STABILITY
Large-scale, coherent structures as drivers of ramjet combustion instabilities N86-17400

FLOW VISUALIZATION
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304
Recent experience in the RAE 5 meter wind tunnel of a china clay method for indicating boundary layer transition
[RAE-TM-AERO-2007] N86-17306
Horseshoe vortex formation around a cylinder N86-17658

FLOWMETERS
Liquid flow calibration --- hydraulic equipment
[CETIM-15-C-251] N86-17691

FLUID DYNAMICS
Analysis of a gas generator system N86-17391
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405
Advanced seals for Liquid Oxygen (LOX) turbopumps N86-17408
Activities report of the Institute of Sound and Vibration Research N86-17685

FLUID FILMS
Advanced seals for Liquid Oxygen (LOX) turbopumps N86-17408

FLUID FLOW
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
Magnetically focused liquid drop radiator
[DE85-017735] N86-17671
Fluid modeling of flow and dispersion in the atmosphere: Historical notes N86-17903

FLUID MECHANICS
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405
Development of a continuous-flow fluidic pump
[DE85-018152] N86-17755
Publications, catalog 1985 N86-18249

FLUIDICS
Fluidizing device for solid particulates
[DE85-006504] N86-17752
Development of a continuous-flow fluidic pump
[DE85-018152] N86-17755

FLUIDIZED BED PROCESSORS
Fluidizing device for solid particulates
[DE85-006504] N86-17752

FLUORESCENCE
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728
Simultaneous measurement of current and plasma density profiles in the TEXT Tokamak
[DE85-017679] N86-18200

FLUTTER ANALYSIS
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment N86-17278

FLUX DENSITY
Metrological provision for measurement of relative energy density distribution over beam cross section and of beam divergence in pulse lasers N86-17643
Photoelectric instrument for measuring relative energy density distribution in beams of pulse lasers N86-17647

FOCUSING
Excimer laser phototherapy for the dissolution of abnormal growth
[DE85-017803] N86-17741

FOG
Heat transfer from a high temperature condensable mixture. 2: Sedimentation of fog condensate
[DE85-018377] N86-17673
Monthly infrared imagery enhancement curves: A tool for nighttime sea fog identification off the New England Coast
[PB85-237725] N86-17966

FOKKER AIRCRAFT
Activities report in aerospace research, with data concerning the scientific committee NLR-NIVR, international cooperation concerning AGARD, DNW, GARTEUR and cooperation with Indonesia N86-17588
FORCED CONVECTION
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
Laminar forced convective heat transfer of power law fluids in isosceles triangular ducts with peripheral wall conduction N86-17659
FORCED VIBRATION
Strategies for dynamic modeling of a helicopter structure
[SNIAS-852-210-101] N86-17350
FORECASTING
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909
Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104
FORGING
Vacuum arc remelting: An overview
[DE85-016458] N86-17751
FORMALDEHYDE
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906
FORMULATIONS
Relationship between components and performance of composite materials. Part 1: BSL914 matrix systems --- carbon fiber-epoxy
[ONERA-RT-1/3636-M-PT-1] N86-17488
FORTRAN
A FORTRAN 77 program and user's guide for the calculation of partial correlation and standardized regression coefficients
[TI85-016573] N86-18018
FOURIER SERIES
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018082] N86-18189
FOURIER TRANSFORMATION
A device for computer-controlled potential modulation in electrochemical Fourier transform infrared spectroscopy
[AD-A159826] N86-17620
Development and application of a direct algorithm adapted to the discrete Fourier transform for the determination of the modal parameters of linear vibration systems
[RUB-IFM-MITT-42] N86-17786
FRACTALS
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
FRACTURE MECHANICS
Cracked ballistic grain tests and analysis N86-17383
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena
[NASA-CR-176485] N86-17475
The use of acoustical caustics in fracture mechanics N86-17781
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate
[TI85-016420] N86-17795
Slow crack growth: Macroscopic and microscopic aspects
[DE85-011165] N86-17798
FRACTURE STRENGTH
Development of refractory composites with improved fracture toughness
[DE86-000257] N86-17479
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate
[TI85-016420] N86-17795
The effect of blunt notches and saw cuts on the static strength of 2024-T3 and 7075-T6 sheet material --- aluminum alloys
[VTH-LR-313] N86-17807
FRACTURING
Recent developments concerning segregation and fracture at grain boundaries
[DE85-018106] N86-17547
FREDHOLM EQUATIONS
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123
FREE ELECTRON LASERS
Collective effects and lattice implications for an FEL bypass ring
[DE85-016563] N86-17735
Density gradient free electron collisionally excited X-ray laser
[DE85-017726] N86-17739
Brightness measurements on the Livermore high brightness test stand
[DE86-000016] N86-18157
FREE FLOW
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
A wind tunnel investigation of the effect of a propulsive jet on controls located on a conical afterbody in subsonic and supersonic free streams
[FFA-TN-1985-11] N86-17318
FREE JETS
Scattering of an acoustic field by a nonhomogeneous nonuniform flow
[ONERA-P-1985-1] N86-18127
FREE VIBRATION
Free vibrations of finite flexible shells and tubes in axial flow N86-17804
FRENCH SATELLITES
Local network interconnection through a satellite point to multipoint link
[ENST-85E007] N86-17369
FRENCH SPACE PROGRAMS
The Telecom 1 power subsystem from design to flight N86-17434
FRENKEL DEFECTS
Basic aspects of ion beam mixing
[DE85-018391] N86-18145
FREQUENCY HOPPING
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
FREQUENCY MULTIPLIERS
Class E frequency multipliers N86-17615
FREQUENCY SHIFT
The use of filters in digital coherent receivers operating in a jamming and noise environment
[AD-A159792] N86-17596
FRICTION
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
FUEL COMBUSTION
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
Numerical simulation method for combustion in an oxyhydrogen rocket motor N86-17283
FUEL CONTAMINATION
The evaluation of copper compounds as potential fuel biocides
[AMTE(M)-84520] N86-17974
FUEL CORROSION
Microbial problem with storage of jet fuel in rock caverns: Development of a process for purification of corrosive jet fuel --- based on the use of powdered silver
[FOA-A-40051-B4] N86-17579
FUEL PRODUCTION
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019
FUEL VALVES
Evaluation of functional experience with safety valves
[BMI-1985-080] N86-17760
FUNCTIONAL DESIGN SPECIFICATIONS
Composite materials: A source of innovation --- aircraft industry
[SNIAS-852-430-113] N86-17493
FUNGICIDES
The evaluation of copper compounds as potential fuel biocides
[AMTE(M)-84520] N86-17974
FUSION REACTORS
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114
NE-213-scintillator-based neutron detection system for diagnostic measurements of energy spectra for neutrons having energies greater than or equal to 0.8 MeV created during plasma operations at the Princeton Tokamak Fusion Test Reactor
[DE85-018079] N86-18198
FUZZY SETS
Performance evaluation of nonlinear optimization methods via pairwise comparison and fuzzy number
[REPT-84-40] N86-18098

G

GALACTIC CLUSTERS
CCD photometry of galactic clusters containing Cepheid variables. Paper 3: Photometry and identification charts for NGC 6067 N86-18276
GALACTIC EVOLUTION
How do galaxies make spiral arms: Stochastic versus gravitational N86-18262
GALACTIC STRUCTURE
How do galaxies make spiral arms: Stochastic versus gravitational N86-18262
GALLIUM ARSENIDES
MMIC antenna technology development in the 30/20 gigahertz band
[NASA-TM-87192] N86-17368
Overview of SERI's high efficiency solar cell research N86-17841
Gallium arsenide solar cell efficiency: Problems and potential N86-17843
N/P GaAs concentrator solar cells with an improved grid and bushbar contact design N86-17844
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
GaAsP on GaP top solar cells N86-17847
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
A possible radiation-resistant solar cell geometry using superlattices N86-17851
Experience with OMCVD production of GaAs solar cells N86-17852
Depletion layer recombination effects on the radiation damage hardness of gallium arsenide cells N86-17859
Performance of Hughes GaAs concentrator cells under 1-MeV electron irradiation N86-17860
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17852
Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864
Thermal stress cycling of GaAs solar cells N86-17865
Cell Research and Technology Workshop N86-17870
GaAs/In/sub 0.25/Ga/sub 0.75As/GaAs, modulation-doped, single, strained quantum-well FET
[DE85-018272] N86-18221
GALLIUM PHOSPHIDES
GaAsP on GaP top solar cells N86-17847
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
GAPS
Narrow band gap amorphous silicon semiconductors
[DE85-017753] N86-18218
GAS ANALYSIS
Sample conditioning and standard preparation for synfuel gas analysis
[DE85-010073] N86-17506
GAS CHROMATOGRAPHY
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906
GAS DYNAMICS
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405
Atmospheric fates of organic chemicals: Prediction of ozone and hydroxyl radical reaction rates and mechanisms
[PB85-241529] N86-17927
GAS EXPLOSIONS
Simulation of flame acceleration in unconfined vapor cloud explosions
[VTT-RR-357] N86-17698
GAS FLOW
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270
Bouyant flow and its effect on internal insulation performance: Numerical approach N86-17388
GAS GENERATORS
Analysis of a gas generator system N86-17391
Oxygen/hydrocarbon combustion devices technology N86-17407
Analysis of a gas generator system
[AD-A156999] N86-17749
GAS INJECTION
Neon gas puff Z-pinch implosions on Proto-2
[DE85-017636] N86-18194
GAS IONIZATION
Investigation of the formation, ionization, and collision dynamics of microclusters using scattering analysis
[MPIS-6/1985] N86-18161

GAS MIXTURES
Operational considerations in monitoring oxygen levels at the National Transonic Facility
[NASA-CR-3953] N86-17359
Separation of a gas from a gas mixture
[DE85-018296] N86-17512
GAS PIPES
Chemical characterization of polyethylene resins and polyethylene gas pipe
[DE85-018346] N86-17573
GAS STREAMS
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219
GAS TURBINE ENGINES
Small, two-stage, partial-admission turbine
N86-17386
A smoke generator for the absolute calibration of gas turbine engine smoke sampling and measuring systems
[RAE-TM-P-1044] N86-17702
GAS TURBINES
Numerical flow analysis for axial flow turbine
N86-17281
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530
Gas turbines in cogeneration: Overall analysis and numerical predictions N86-17758
A rational efficiency analysis of comparisons and trends in gas turbines for cogeneration N86-17759
Development of low-emission gas turbine combustion systems
[BMFT-FB-T-85-064] N86-17763
Efficiency calculation for gas turbines: Searching for simple relations between thermodynamic efficiency of a gas turbine and efficiency determining parameters
[SS-44] N86-17766
A concept for the quality assurance of ceramic gas turbine components using nondestructive tests
[BMFT-FB-T-85-094] N86-17773
GAS WELDING
Fatigue in a welded join made by pulsed MIG welding of a 304 type stainless steel
[BLL-RISLEY-TR-5233-(9091.9F)] N86-17783
GASEOUS DIFFUSION
Separation of a gas from a gas mixture
[DE85-018296] N86-17512
GASES
Separation of a gas from a gas mixture
[DE85-018296] N86-17512
Improved fiberoptic spectrophotometer
[DE85-017792] N86-17710
Position sensitive gas counter readout system
[DE85-017953] N86-17713
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
Dispersion of heavy gases N86-17899
GATES (CIRCUITS)
Modelling transmission gates in ELLA
[AD-A159557] N86-17618
GAUGE THEORY
Lorentz anomaly in arbitrary dimensions
[DE86-001332] N86-18116
Gravitational counterterms in an axial gauge
[DE86-001329] N86-18237
GEARS
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
GENETIC ENGINEERING
HLA-D: The T cell perspective
[AD-A160019] N86-17976
Clonal analysis of HLA-DR and -dQ associated determinants: Their contribution to dw specificities
[AD-A160059] N86-17977
GENETICS
HLA-D: The T cell perspective
[AD-A160019] N86-17976
Clonal analysis of HLA-DR and -dQ associated determinants: Their contribution to dw specificities
[AD-A160059] N86-17977
GEODESIC LINES
Differential metrics in probability spaces based on entropy and divergence measures
[AD-A160301] N86-18066
GEODETIC COORDINATES
Geometric correction of remote sensing images by means of ground control points
[MDLK-R-8429] N86-17828
GEOIDS
Contributions to geodesy, photogrammetry, and cartography, series 2
[ISSN-0469-4244] N86-17818
A system of computer programs for an astrogravimetric geoid determination N86-17819
GEOLOGICAL FAULTS
The mechanics of a near-surface crack under uniform pressure or shear in a transversely isotropic medium: With applications to hydraulic fracture N86-17780
Advanced techniques for lithologic and fracture analysis utilizing thematic mapper and topographic data
[DE85-018220] N86-17935
GEOLOGY
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937
North Central regional geologic characterization report. Volume 2: Plates
[DE86-000419] N86-17939
Sources of information on engineering geology and related topics for northeastern Illinois
[PB85-241933] N86-17948
GEOMAGNETISM
Generation of magnetic field aligned currents, parallel electric fields, and inverted-V structures by plasma pressure inhomogeneities in the magnetosphere
[KGI-PREPRINT-073] N86-17941
GEOMETRIC RECTIFICATION (IMAGERY)
Geometric correction of remote sensing images by means of ground control points
[MDLK-R-8429] N86-17828
Analysis of the radiometric relation between false color aerial photographs and multispectral scanning (MSS) images
[MDLK-R-8337] N86-17829
GEOPHYSICS
Multiwell Experiment Geophysics Program
[DE86-001147] N86-17940
National Geophysical Data Center
[PB85-248458] N86-17947
Activities report in geophysics
[UIO-SR-85-01] N86-18203
GEORGIA
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822
GEOSYNCHRONOUS ORBITS
Radiation exposure and performance of multiple burn LEO-GEO orbit transfer trajectories N86-17417
GEOTHERMAL ENERGY UTILIZATION
Sandia geothermal technology program: Interactions with other DOE research and CSDP
[DE85-017814] N86-17882
GEOTHERMAL TECHNOLOGY
Sandia geothermal technology program: Interactions with other DOE research and CSDP
[DE85-017814] N86-17882
GERMANIUM
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858
GIBBS FREE ENERGY
Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device
[DE85-018139] N86-18190
GIOTTO MISSION
The Giotto power supply subsystem N86-17436
GLACIOLOGY
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
GLASS
Amorphous silicon solar cells, phase 2
[BMFT-FB-T-85-084] N86-17891
Inelastic scattering from amorphous solids
[DE85-018371] N86-18230
GLASS FIBER REINFORCED PLASTICS
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites
[OUEL-1579/85] N86-17481
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568
GLASS FIBERS
Activities report in applied physics N86-18119
GLIDERS
Environment-friendly propeller aircraft with a maximum weight of 5700 kg, and motor gliders: Publication of the noise values N86-17341
GLUONS
Quark dynamics of N anti N annihilation
[DE85-017508] N86-18153
New and old accelerators: What can they do for astrophysics
[DE85-013220] N86-18165
GOLD
Surface-enhanced raman spectroscopy as a probe of adsorbate-surface bonding: Simple alkenes and alkynes adsorbed at gold electrodes
[AD-A160033] N86-17503
GRADIENT INDEX OPTICS
Anamorphic gradient index lens systems N86-18177
GRAIN BOUNDARIES
Recent developments concerning segregation and fracture at grain boundaries
[DE85-018106] N86-17547
GRANULAR MATERIALS
The boriding of refractory metals
[BLL-BISI-23037-(9022.060)] N86-17527
Viscosity, granular-temperature and stress calculations for shearing assemblies of inelastic: Frictional disks
[DE85-015173] N86-17794
GRAPH THEORY
On the consistency of Koomen's fair abstraction rule
[CWI-CS-R8511] N86-18094
GRAPHITE
Low cost carbon/carbon nozzles for solid rocket motors N86-17381
Design and performance of large area monolithic electron guns for the Aurora KrF laser system
[DE85-014112] N86-17734
GRAPHITE-EPOXY COMPOSITES
Effects of high energy radiation on the mechanical properties of epoxy-graphite fiber reinforced composites
[NASA-CR-176487] N86-17476
GRAPHITE-POLYIMIDE COMPOSITES
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477
GRAPHS (CHARTS)
The GRAL graphic system for situational maps
[FOA-C-50007-H2] N86-17824
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs
[PB85-248110] N86-17967
Tsunamis in Peru-Chile
[PB85-247815] N86-17973
GRASSES
Hydrological description of a study area around pump station 't Klooster (the Netherlands); application of hydrological models and remote sensing
[NOTA-1542] N86-17831
Simple method for the determination of regional daily evapotranspiration of crops using remote sensing
[NOTA-1580] N86-17832
Study of effects of pump station Olden Eibergen (Netherlands) on agriculture using remote sensing and hydrological models
[NOTA-1544] N86-17833
GRAVIMETRY
Contributions to geodesy, photogrammetry, and cartography, series 2
[ISSN-0469-4244] N86-17818
A system of computer programs for an astrogravimetric geoid determination N86-17819
GRAVITATION THEORY
Gravitational counterterms in an axial gauge
[DE86-001329] N86-18237
GRAVITATIONAL EFFECTS
How do galaxies make spiral arms: Stochastic versus gravitational N86-18262
GRAVITY WAVES
Experimental generation of stratified shear flows
[AD-A160304] N86-17668
GREAT BASIN (US)
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 1: Kinematics of Basin-Range intraplate extension
[NASA-CR-176498] N86-17928
GREENLAND
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
GROUND EFFECT (AERODYNAMICS)
Wind speed profiles over terrain with roughness changes for flat or hilly sites
[ESDU-84011-A] N86-17949
GROUND STATE
Lithium soft X-ray laser N86-17730
The red band spectrum of gaseous CaH. Molecular equilibrium ground state constants. Term values of the A(2)Pi, B(2)Sigma, and X(2)Sigma states
[USIP-85-13] N86-18164
GROUND TRUTH
The 1984 L-band radar experiment. Part 1: Ground truth Flevo (Netherlands) 1984 --- SIR-B N86-17609
Spectroradiometric calibration of the Thematic Mapper and multispectral scanner system
[E86-10022] N86-17816

GROUND WATER
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822
Water resources data for Oklahoma, water year 1983
[PB85-236289] N86-17834
Water resources data for Michigan, water year 1984
[PB85-237741] N86-17835
Water resources data for Virginia water year 1984
[PB85-242105] N86-17836
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
GROUND WIND
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951
GROUP THEORY
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109
GUIDANCE SENSORS
Weld seam-tracking with an optical sensor using structured light N86-17764
Design for a path control algorithm of a robot arm with external sensor control N86-18057
GUN PROPELLANTS
Initial results for the failure strength of a LOVA gun propellant at high pressures and various strain rates N86-17402
GUNS (ORDNANCE)
Measurements of the two phase flow in the neighborhood of the exhaust of a 7.62 mm caliber gun
[ISL-R-110/84] N86-17518
Visualization of interior ballistic phenomena
[SNPE-NT-27/85/CRB/NP] N86-17580
GYROCOMPASSES
Elastic wave gyrometer
[REPT-26/5052] N86-17724
GYROSCOPIC STABILITY
Results of PRIM gyroscope testing: Conclusions regarding PRIM effects, supplement 1
[DE85-012933] N86-17706

H

HADRONS
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
Applications of quantum chromodynamics to hadronic and nuclear interactions
[DE86-000054] N86-18150
HAMILTON-JACOBI EQUATION
Wave propagation in thick damped laminated plates
[AASU-344] N86-17787
HANKEL FUNCTIONS
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100
HARDENING
The hardening of technical adhesives
[CETIM-101370] N86-17576
HARDENING (MATERIALS)
Development of a single phase surface layer of TiN on steel
[REPT-1570] N86-17550
Study of the surface heat treatment of cutting tools and samples of grooved cylinders made by a laser beam. Comparison with an electron beam
[REPT-1578] N86-17551
Development of a manufacturing procedure to produce cold rolling cylinders by deposing a high alloy steel layer on a normal steel cylinder
[REPT-1645] N86-17586
HARDNESS
Heavy metal alloys containing 30% to 90% tungsten
[DE85-017896] N86-17546
HARMONIC ANALYSIS
Response of viscoelastic slab to viscous slab to viscous fluid flow N86-17657
Recent progress on boundary value problems on Lipschitz domains
[MATH-REPT-84-133] N86-18064
HARMONIC EXCITATION
Magnetic field of excitation winding in experimental cryogenic turbogenerator N86-17653
HARMONIC FUNCTIONS
An introductory comparative study of the Hopf bifurcation method and the Dee harmonic balance method
[LAB-REPT-757] N86-18113
HARMONIC RADIATION
Waves with harmonic structure below and above the Lower Hybrid Resonance (LHR) observed on the Cleft Energetics Transport and Ultraviolet Radiation (CENTAUR) 35.001 and 35.002 rockets
[DRI-2-85] N86-17946
HAZARDS
Natural Phenomena Hazards Modeling Project. Extreme wind/tornado hazard models for Department of Energy sites. Revision 1
[DE85-018156] N86-17957
HAZE
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
HEART DISEASES
A comparison of postmortem coronary atherosclerosis findings in general aviation pilot fatalities
[AD-A159811] N86-17982
HEAT EXCHANGERS
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
HEAT FLUX
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672
Condensation of the underside of a horizontal surface in a closed vessel
[DE85-018379] N86-17674
HEAT OF FORMATION
Self-propagating reactions for synthesis of high temperature materials
[AD-A159869] N86-17535
HEAT PIPES
Limitations in variable conductance heat pipe performance and control predicted by the current steady-state model developed at NLR
[NLR-MP-84009-U] N86-17695
HEAT PUMPS
Vapor compression heat pump system field tests at the TECH complex
[DE85-016364] N86-17670
Breadboard development of a hydraulically coupled free piston engine heat pump compressor
[DE85-005242] N86-17874
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
HEAT RADIATORS
Magnetically focused liquid drop radiator
[DE85-017735] N86-17671
HEAT RESISTANT ALLOYS
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530
Creep-rupture behavior of iron superalloys in high-pressure hydrogen
[NASA-CR-175027] N86-17531
Spectral analysis and metallographic investigations of corrosion and precipitation products of high temperature alloys
[JUEL-1975] N86-17553
Vacuum arc remelting: An overview
[DE85-016458] N86-17751
HEAT STORAGE
Chemically bonded ceramic materials for use in thermal energy storage devices
[DE85-018078] N86-17572
Mathematical model for the distribution of the long-term efficiency of phase-change materials and its application in heat-storage
[DE85-016451] N86-17873
Composite materials for thermal energy storage
[DE85-017743] N86-17881
Numerical study of the performance of latent heat storage for solar dynamic power systems
[DE85-018101] N86-17884
HEAT TOLERANCE
Heat transfer in impermeable clothing: Sweat plays a role after all
[IZF-1985-9] N86-17992
HEAT TRANSFER
Analysis of a gas generator system N86-17391
Oxygen/hydrocarbon combustion devices technology N86-17407
finite element analysis of transient forced convection and conjugate heat transfer N86-17660
Heat transfer from a high temperature condensable mixture. 2: Sedimentation of fog condensate
[DE85-018377] N86-17673
Condensation of the underside of a horizontal surface in a closed vessel
[DE85-018379] N86-17674
Analysis of the solar powered/fuel assisted Rankine cycle cooling system. Phase 1: Revision
[DE85-016173] N86-17675
Thermal transport, mass-ablation and preheat in laser-target experiments
[DE85-017584] N86-17742
Analysis of a gas generator system
[AD-A156999] N86-17749
Analysis of simultaneous heat and mass transfer in soils below solar ponds
[DE85-012163] N86-17877
Composite materials for thermal energy storage
[DE85-017743] N86-17881
Heat transfer in impermeable clothing: Sweat plays a role after all
[IZF-1985-9] N86-17992
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236
HEAT TRANSFER COEFFICIENTS
Low-fin staggered tube banks: Heat transfer and pressure-loss for turbulent single-phase crossflow
[ESDU-84016] N86-17664
HEAT TREATMENT
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477
Study of the surface heat treatment of cutting tools and samples of grooved cylinders made by a laser beam. Comparison with an electron beam
[REPT-1578] N86-17551
The hardening of technical adhesives
[CETIM-101370] N86-17576
HEAVY IONS
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137
Model for charge state distributions of heavy Coulomb explosion fragment ions
[DE85-018363] N86-18144
Radioactive ion beam research at LLNL
[DE85-018183] N86-18156
New and old accelerators: What can they do for astrophysics
[DE85-013220] N86-18165
High temperature experiment for accelerator inertial fusion
[DE85-016553] N86-18191
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
HELICAL FLOW
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219
HELICOPTER PERFORMANCE
Helicopter-ship qualification testing
[NLR-MP-84062-U] N86-17343
HELICOPTER TAIL ROTORS
Analysis of the noise emitted by a tail rotor N86-18129
HELICOPTERS
The deiced super Puma --- helicopters
[SNIAS-852-210-104] N86-17328
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329
Helicopter-ship qualification testing
[NLR-MP-84062-U] N86-17343
Strategies for dynamic modeling of a helicopter structure
[SNIAS-852-210-101] N86-17350
Spectroradiometric calibration of the Thematic Mapper and multispectral scanner system
[E86-10022] N86-17816
Helicopter internal noise treatment. Recent methodolgies and practical applications
[SNIAS-852-210-102] N86-18133
HELIOSTATS
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875
HELIUM
Operational tests of the BNL 24.8 kW, 3.8 K helium refrigerator
[DE85-017851] N86-17584

HELMET MOUNTED DISPLAYS
Plan for evaluation of the training potential of helmet-mounted display and computer-generated synthetic imagery
[AD-A160299] N86-17705
HEMOGLOBIN
Inverse Faraday effect in hemoglobin detected by Raman spectroscopy: An example of magnetic resonance Raman activity
[AD-A159806] N86-17975
HETERODYNING
Investigation of the quantum efficiency of optical heterodyne detectors
[NASA-CR-176489] N86-18179
HETEROGENEITY
An axiomatic theory of heterogeneity and homogeneity
[NLR-MP-84054-U] N86-18084
HIGH ENERGY INTERACTIONS
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143
New and old accelerators: What can they do for astrophysics
[DE85-013220] N86-18165
The NA27 trigger — proton beam bubble chamber experiment (NA27)
[USIP-85-10] N86-18172
The F meson background and F candidates in 360 GeV c/Pi(-) p and pp interactions
[USIP-85-15] N86-18174
HIGH FREQUENCIES
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
Microwave detector
[DE85-017797] N86-17711
HIGH PRESSURE
Initial results for the failure strength of a LOVA gun propellant at high pressures and various strain rates N86-17402
Report on Kevlar -49 composite pressure vessel safety technology program N86-17412
Creep-rupture behavior of iron superalloys in high-pressure hydrogen
[NASA-CR-175027] N86-17531
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
Structure of high-pressure KNO3-4
[DE85-018361] N86-18222
HIGH REYNOLDS NUMBER
Validation and comparison with experiment of a high Reynolds number transonic flow airfoil analysis code NSFOIL N86-17294
A study of high Reynolds number laminar separation N86-17302
Numerical simulation of flow around circular cylinders at high Reynolds numbers — offshore structures
[Z-50551] N86-17697
HIGH SPEED
High speed steel working tools — milling
[CETIM-102360] N86-17762
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060
HIGH TEMPERATURE
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530
Self-propagating reactions for synthesis of high temperature materials
[AD-A159869] N86-17535
Heat transfer from a high temperature condensable mixture. 2: Sedimentation of fog condensate
[DE85-018377] N86-17673
A concept for the quality assurance of ceramic gas turbine components using nondestructive tests
[BMFT-FB-T-85-094] N86-17773
Continuous measurement of sodium aerosols in the air N86-17894
High temperature experiment for accelerator inertial fusion
[DE85-016553] N86-18191
HIGH TEMPERATURE PLASMAS
The hot plasma spectrometers on Viking
[KGI-PREPRINT-077] N86-17377
HIGH TEMPERATURE TESTS
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426
Stress corrosion cracking of 316 stainless steel in high temperature water
[BR94397] N86-17529
HIGH VACUUM
Vacuum chamber pressure effects on thrust measurements N86-17425
HIGH VOLTAGES
The design of shielded enclosures, especially for high-voltage laboratories
[S/T-REPT-VOL-2-NO-11] N86-17360
Design of high-voltage, high-power, solid state remote power controllers for aerospace applications N86-17456
Discharge detection in high voltage flight hardware N86-17457
High-voltage measurements using digital techniques
[S/T-REPT-VOL-2-NO-8] N86-17636
PASP: A high voltage array experiment N86-17863
HIGHWAYS
International Symposium on Mechanical Properties of Special Concrete
[PB85-234961] N86-17770
Vibrational stability behaviour of orthotropic plates in steel roads bridges: Application for financial support of a research project by the ECSC (European Coal and Steel Community)
[BLL-TRANS-3225-(9057.2451)] N86-17778
HIPPARCOS SATELLITE
An alternative for satellite power distribution N86-17450
Ad astra HIPPARCOS. The European Space Agency's astrometry mission
[ESA-BR-24] N86-18282
HISTORIES
The CWD 4000 project (formerly THT-1) — windmill
[WM-075] N86-17888
Fluid modeling of flow and dispersion in the atmosphere: Historical notes N86-17903
HOLOGRAPHIC INTERFEROMETRY
Applications of holographic interferometry to nondestructive inspections of composite material structures
[SNIAS-852-430-112] N86-17492
Description of a nondestructive facility using holographic interferometry
[SNIAS-852-430-105] N86-17726
HOMOGENEITY
Atmospheric boundary layer modeling N86-17896
An axiomatic theory of heterogeneity and homogeneity
[NLR-MP-84054-U] N86-18084
HOOPS
Hoops
[CETIM-13-N-243] N86-17767
HOPPERS
Fluidizing device for solid particulates
[DE85-006504] N86-17752
HORIZONTAL ORIENTATION
Comment on the yaw stability of a horizontal-axis wind turbine at small angles of yaw
[NPL-MP-84084-U] N86-17312
HOT CORROSION
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530
HOT PRESSING
High-field ZnO varistors: microstructures and properties
[DE85-018136] N86-17626
HOT SURFACES
Ignition behavior of small hot components in flammable atmospheres
[PTB-W-25] N86-17519
HOT-WIRE ANEMOMETERS
Large-scale, coherent structures as drivers of ramjet combustion instabilities N86-17400
HUMAN BEINGS
Assessment of individual human exposures to ozone in a health study
[PB85-245975] N86-17984
HUMAN FACTORS ENGINEERING
Human-machine interfaces for teleoperators: An overview of research and development at the Oak Ridge National Laboratory. Consolidated Fuel Reprocessing Program
[DE85-017713] N86-17990
A Computer Aided Design (CAD) system as a tool for the ergonomist in developing man-machine systems
[IZF-1985-10] N86-17993
Color on displays. Part 1: The psychophysical and physiological aspects
[IZF-1985-11] N86-17994
Helicopter cockpit organization for night vision
[SNIAS-852-210-103] N86-17996
Noise prevention N86-18132
Methods for Designing Software to Fit Human Needs and Capabilities. Proceedings of the Workshop on Software Human Factors
[AD-A156647] N86-18242
HUMAN PERFORMANCE
Photosimulation of target acquisition in the presence of smoke: A pilot study
[IZF-1984-36] N86-17966
HUMIDITY
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951
HYDRATES
Mathematical model for the distribution of the long-term efficiency of phase-change materials and its application in heat-storage
[DE85-016451] N86-17873
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
HYDRAULIC CONTROL
Breadboard development of a hydraulically coupled free piston engine heat pump compressor
[DE85-005242] N86-17874
HYDRAULIC EQUIPMENT
Slow motor: ISO round robin tests — hydraulic motors
[CETIM-N-01270] N86-17587
Liquid flow calibration — hydraulic equipment
[CETIM-15-C-251] N86-17691
HYDRAULIC FLUIDS
Liquid flow calibration — hydraulic equipment
[CETIM-15-C-251] N86-17691
HYDRAZINES
Corrosion of metals by hydrazine N86-17395
Explosive decomposition of hydrazine due to rapid gas compression N86-17430
HYDROCARBON FUELS
Low temperature methanol synthesis catalyst and process development
[DE85-017837] N86-17511
HYDRODYNAMIC COEFFICIENTS
Unsteady three-dimensional surface theory with the free surface effect: Supercritical case
[ONERA-P-1984-1] N86-17683
The steady lifting surface theory with a free-surface — hydrodynamic forces
[ONERA-P-1984-2] N86-17684
HYDROFOILS
Unsteady three-dimensional surface theory with the free surface effect: Supercritical case
[ONERA-P-1984-1] N86-17683
The steady lifting surface theory with a free-surface — hydrodynamic forces
[ONERA-P-1984-2] N86-17684
HYDROGEN
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472
Creep-rupture behavior of iron superalloys in high-pressure hydrogen
[NASA-CR-175027] N86-17531
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220
HYDROGEN BONDS
Analysis of dielectric layers for Very Large Scale Integration (VLSI) applications, especially the influence of stoichiometry and hydrogen content on the properties of plasma nitride layers
[BMFT-FB-T-85-059] N86-17635
HYDROGEN EMBRITTLEMENT
The influence of heat affected zone microstructures on the ductility and hydrogen embrittlement of 9 percent Cr 1 percent Mo steel
[AERE-R-11473] N86-17564
HYDROGEN OXYGEN ENGINES
Numerical simulation method for combustion in an oxyhydrogen rocket motor N86-17263
The 1985 JANNAF Propulsion Meeting, volume 1
[AD-A161084] N86-17380
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405
HYDROGEN PRODUCTION
Method for improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system
[DE85-017723] N86-17978
HYDROGEOLOGY
National Geophysical Data Center
[PB85-248458] N86-17947
HYDROLOGY
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822

Water resources data for Virginia water year 1984
[PB85-242105] N86-17836
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937

HYDROLOGY MODELS
Hydrological description of a study area around pump station 't Klooster (the Netherlands); application of hydrological models and remote sensing
[NOTA-1542] N86-17831
Study of effects of pump station Olden Eibergen (Netherlands) on agriculture using remote sensing and hydrological models
[NOTA-1544] N86-17833

HYDROLYSIS
Plutonium(4) hydrous polymer chemistry
[DE85-016594] N86-17570

HYDROPHONES
Array positioning requirements
[AD-A159866] N86-18124

HYDROXIDES
Improvement of the process for electrochemical impregnation of nickel hydroxide electrodes --- nickel cadmium batteries N86-17447
Gelation of aluminum hydroxide sols
[SNIAS-852-430-19] N86-17562

HYDROXYL RADICALS
Atmospheric fates of organic chemicals: Prediction of ozone and hydroxyl radical reaction rates and mechanisms
[PB85-241529] N86-17927

HYPERBOLIC DIFFERENTIAL EQUATIONS
Discretization of hyperbolic differential equations with periodic solutions
[CWI-NM-R8510] N86-18091

HYPERFINE STRUCTURE
Hyperfine fields in Fe-Ni-X alloys and their application to a study of tempering of 9Ni steel
[DE85-011517] N86-17538

HYPERSONIC VEHICLES
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
An interactive design system for winged space vehicle N86-17269

I

ICE
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271

ICE ENVIRONMENTS
Stochastic measurements and systems implications
[AD-A159827] N86-18122

ICE FORMATION
The deiced super Puma --- helicopters
[SNIAS-852-210-104] N86-17328

ICE MAPPING
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817

IGNEOUS ROCKS
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937
North Central regional geologic characterization report. Volume 2: Plates
[DE86-000419] N86-17939

IGNITION
Oxygen/hydrocarbon combustion devices technology N86-17407
Ignition behavior of small hot components in flammable atmospheres
[PTB-W-25] N86-17519
Calculating the vulnerability of synthetic polymers to autoignition during nuclear flash
[DE85-016649] N86-17571

ILLUMINATING
Helicopter cockpit organization for night vision
[SNIAS-852-210-103] N86-17996

IMAGE CONTRAST
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
The Smoke Transmission and Reflection Threshold (START) model; the Oldebroek (Netherlands) 2 trials, May 1981
[IZF-1984-22] N86-18187

IMAGE CONVERTERS
Heat image generators: State of affairs by the exploration of some possibilities
[IZF-1985-15] N86-17723

IMAGE FURNACES
Utilization of the Swedish experiment module within the TEXUS 9/10 flight opportunity
[M5/7-14] N86-17363

IMAGE INTENSIFIERS
Helicopter cockpit organization for night vision
[SNIAS-852-210-103] N86-17996
Nanosecond optical shutters
[DE85-017535] N86-18182

IMAGE PROCESSING
Image processor architectures and a data-driven image processore: TIP-1 N86-17287
Functional built-in-test in a pipeline image processor --- satellite imagery
[NLR-MP-84020-U] N86-17379
MUPPATS: A multiparticle 3D imaging detector system
[DE85-018451] N86-17715
Software quality metrics of the Faint Object Camera (FOC) image processing software
[ESA-CR(P)-2039] N86-17716
CNPq/INPE-LANDSAT system
[E86-10019] N86-17814
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
Advanced techniques for lithologic and fracture analysis utilizing thematic mapper and topographic data
[DE85-018220] N86-17935
On-line superposition of geographical data to TIROS-N type meteorological satellite images
[NLR-TR-82133-U] N86-17962
White light optical information processing
[AD-A160311] N86-18180

IMAGERY
CNPq/INPE-LANDSAT system
[E86-10019] N86-17814

IMAGING TECHNIQUES
Microelectronic image sensors: A report from the Charge Transfer Device (CTD) team at FOA 3
[FOA-C-30391-E1,E3] N86-17631
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
Development of passive acoustic imaging for large heat transfer components
[DE85-018384] N86-18126
Imaging techniques utilizing optical fibers and tomography
[DE85-017536] N86-18186

IMPACT DAMAGE
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena
[NASA-CR-176485] N86-17475

IMPACT LOADS
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena
[NASA-CR-176485] N86-17475

IMPACT RESISTANCE
Evaluation of the Ciba-Geigy R6376 IM6 prepreg --- fiber reinforced plastics
[DGT-26.649] N86-17485

IMPACT STRENGTH
Relationship between components and performance of composite materials. Part 1: BSL914 matrix systems --- carbon fiber-epoxy
[ONERA-RT-1/3636-M-PT-1] N86-17488

IMPACT TESTS
A pendulum impactor for measuring the resistance of materials to jerk strains
[FOA-C-20577-D4] N86-17725
Numerical simulation of impact tests and comparison of behavior laws
[SNIAS-852-320-101] N86-17813

IMPEDANCE MEASUREMENT
Use of impedance measurements to model nickel-cadmium batteries N86-17446

IMPELLERS
Flow calculation in pump impellers by finite elements N86-17679

IMPLOSIONS
Neon gas puff Z-pinch implosions on Proto-2
[DE85-017636] N86-18194

IMPREGNATING
Improvement of the process for electrochemical impregnation of nickel hydroxide electrodes --- nickel cadmium batteries N86-17447
Physical chemical characterization tests of the 5245C NARMCO preimpregnation resin, test report M3-449000, part 1 --- carbon fiber impregnation
[PV-M3-449000-PT-1] N86-17490

IMPROVEMENT
Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625
Improved fiberoptic spectrophotometer
[DE85-017792] N86-17710

IMPURITIES
On recovery of platinum from spent catalysts
[CE-TRANS-8042] N86-17499

INCIDENT RADIATION
The scattering of Gaussian beams incident on a transmitting layer configuration N86-17589

INCOMPRESSIBLE FLOW
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations N86-17273
Direct simulation of the incompressible flow at high Reynolds number by finite difference method N86-17276
Computation of the two-dimensinal incompressible Navier-Stokes equations using an implicit factored method N86-17277
A study of high Reynolds number laminar separation N86-17302
An improved pressure iteration procedure for the SOLA algorithm applied to the solution of the incompressible Navier-Stokes equations
[VKI-TM-35] N86-17682

INCONEL (TRADEMARK)
Survey of physical property data for several alloys
[DE85-018138] N86-17542

INDEXES (DOCUMENTATION)
Study of free-index phrases
[PB85-240117] N86-18253

INDEXES (RATIOS)
An axiomatic theory of heterogeneity and homogeneity
[NLR-MP-84054-U] N86-18084

INDIAN SPACECRAFT
Flight experience with an integrated bipropellant propulsion system: INSAT 1 N86-17431

INDIUM
Method of synthesizing and growing copper-indium-diselenide (CuInSe2) crystals
[DE85-017729] N86-18215

INDOOR AIR POLLUTION
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906

INDUCTANCE
SAPIENS memo 9: The dependance of the electric field on the inductance of the termination --- of an electromagnetic pulse (EMP) simulator
[FOA-C-30399-A3] N86-17606

INDUCTION MOTORS
Microprocessor control of wind-driven induction generators N86-18050

INDUCTORS
Designing high frequency ac inductors using ferrite and Molypermalloy Powder Cores (MPP) N86-17452

INDUSTRIAL SAFETY
Ignition behavior of small hot components in flammable atmospheres
[PTB-W-25] N86-17519
Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
[MBL-1985-6] N86-17980

INELASTIC SCATTERING
Investigation of the formation, ionization, and collision dynamics of microclusters using scattering analysis
[MPIS-6/1985] N86-18161
Inelastic scattering from amorphous solids
[DE85-018371] N86-18230

INERTIAL CONFINEMENT FUSION
High temperature experiment for accelerator inertial fusion
[DE85-016553] N86-18191

INERTIAL PLATFORMS
Operational application of the STALINS method for measuring take-off and landing trajectories
[NLR-TR-83010-U] N86-17346

INERTIAL UPPER STAGE
Improved space motor demonstration N86-17413
IUS propulsion status N86-17415

INFORMATION DISSEMINATION
Sources of information on engineering geology and related topics for northeastern Illinois
[PB85-241933] N86-17948

INFORMATION MANAGEMENT
CAD-CAM database management at Bendix Kansas City
[DE85-017579] N86-18001
Bibliographic post-processing with the TIS Intelligent Gateway: Analytical and communication capabilities
[DE85-018153] N86-18245
INFORMATION RETRIEVAL
Novel computer architectures for data storage and retrieval
[BLRDR-5845] N86-18005
Intelligent gateway processors as integrators of CAD/CAM networks
[DE85-016287] N86-18025
Bibliographic post-processing with the TIS Intelligent Gateway: Analytical and communication capabilities
[DE85-018153] N86-18245
Propositions to implement a computerized private document retrieval system. Presentation of the Personalized Documentation Aid Tool (OPAD)
[ENST-85E001] N86-18248
INFORMATION SYSTEMS
Information Systems development aids
[DE85-018161] N86-18246
INFORMATION THEORY
An axiomatic theory of heterogeneity and homogeneity
[NLR-MP-84054-U] N86-18084
Study of free-index phrases
[PB85-240117] N86-18253
INFRARED ASTRONOMY
Infrared observations of novae N86-18272
INFRARED DETECTORS
Nonintrusive shaft speed sensor N86-17406
Monthly infrared imagery enhancement curves: A tool for nighttime sea fog identification off the New England Coast
[PB85-237725] N86-17966
INFRARED IMAGERY
Heat image generators: State of affairs by the exploration of some possibilities
[IZF-1985-15] N86-17723
INFRARED PHOTOMETRY
Infrared observations of novae N86-18272
Photometry and radial velocities of 27 southern galactic Cepheids N86-18273
Optical and infrared photometry of southern early-type shell stars and pre-main-sequence variables N86-18274
Photometry of R Coronae Borealis and hydrogen-deficient carbon stars, 1982-3 N86-18275
CCD photometry of galactic clusters containing Cepheid variables. Paper 3: Photometry and identification charts for NGC 6067 N86-18276
INFRARED RADIATION
Some aspects of the atmospheric radiance model of LOWTRAN 6
[DFVLR-FB-85-33] N86-17945
INFRARED SPECTRA
Learning algorithms in the infrared
[DE85-016441] N86-17507
INFRARED SPECTROMETERS
Learning algorithms in the infrared
[DE85-016441] N86-17507
A device for computer-controlled potential modulation in electrochemical Fourier transform infrared spectroscopy
[AD-A159826] N86-17620
INFRARED SPECTROSCOPY
Preparation of the helium-cooled German Infrared Laboratory (GIRL) interferometer for scientific use on Spacelab
[MPE-192] N86-17721
INGOTS
Vacuum arc remelting: An overview
[DE85-016458] N86-17751
INITIATION
Characterization of the electromagnetic radiation preceding lightning
[ONERA-NT-1985-1] N86-17960
INJECTION
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
INJECTION MOLDING
Study on the measuring of polymer rheological properties by adapting an injection molding machine
[CETIM-5-650-06] N86-17574
A method of fabricating silicon carbide mouldings
[BLL-RISLEY-TR-5206-(9091.9F)] N86-17747
INLET NOZZLES
Large-scale, coherent structures as drivers of ramjet combustion instabilities N86-17400
INORGANIC COMPOUNDS
Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
[MBL-1985-6] N86-17980
INPUT/OUTPUT ROUTINES
NOSC UNIBUS (Trademark) UNIVAC Input/Output controller
[AD-A159802] N86-17999
INSPECTION
Applications of holographic interferometry to nondestructive inspections of composite material structures
[SNIAS-852-430-112] N86-17492
Quadrinomial distribution for the characterization of nondestructive inspection (NDI) reliability
[NLR-MP-84064-U] N86-17774
Reliability of nondestructive inspection
[NLR-TR-84011-U] N86-17775
INSTRUMENT ERRORS
Development of a piezoelectric quartz pressure sensor for avionics with excellent long term stability (with final demonstration of the results on a prototype)
[BMFT-FB-W-85-010] N86-17353
INTEGERS
Implementation of a new primality test — prime numbers
[CWI-CS-R8505] N86-18093
INTEGRAL EQUATIONS
A numerical solution of the transonc integral equation and its application to three-dimensional transonic wing design N86-17298
A wing design based on the three-dimensional transonic inverse method and the comparison with the wind tunnel testing data N86-17299
Unsteady three-dimensional surface theory with the free surface effect: Supercritical case
[ONERA-P-1984-1] N86-17683
The steady lifting surface theory with a free-surface — hydrodynamic forces
[ONERA-P-1984-2] N86-17684
Thermodynamic properties and microscopic structure of fluids and fluid mixtures
[DE85-016482] N86-18234
INTEGRALS
Computation of all the amicable pairs below 10 billion
[CWI-NM-R8503] N86-18087
INTEGRATED CIRCUITS
Integrated optoelectronic circuits and their modular designs for residue number computation N86-17614
INTELLIGIBILITY
Application of active noise reduction for hearing protection and speech intelligibility improvement
[IZF-1985-7] N86-18131
INTELSAT SATELLITES
A synchronized dc/dc converter for the data telemetry system of INTELSAT 6 N86-17440
INTERFACE STABILITY
One-dimensional prediction of the interface motion separating two immiscible fluids enclosed in a long duct
[PDR/CFDU/IC/19] N86-17690
INTERFACES
Human-machine interfaces for teleoperators: An overview of research and development at the Oak Ridge National Laboratory. Consolidated Fuel Reprocessing Program
[DE85-017713] N86-17990
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128
INTERGRANULAR CORROSION
Recent developments concerning segregation and fracture at grain boundaries
[DE85-018106] N86-17547
Pressing effect and stress corrosion cracking of an extruded AlZnMgCu type aluminum alloy
[BMFT-FB-T-85-087] N86-17558
INTERIOR BALLISTICS
Visualization of interior ballistic phenomena
[SNPE-NT-27/85/CRB/NP] N86-17580
INTERMETALLICS
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
INTERNAL COMBUSTION ENGINES
Heat transfer in internal combustion engines
[DE85-011495] N86-17757
Development of low-emission gas turbine combustion systems
[BMFT-FB-T-85-064] N86-17763
Hybrid gas/electric vehicle
[DE85-016736] N86-18254
INTERNAL FRICTION
Internal friction study of strain aging in alloys
[DE85-018367] N86-17543
INTERNATIONAL COOPERATION
Slow motor: ISO round robin tests — hydraulic motors
[CETIM-N-01270] N86-17587
Activities report in remote sensing training N86-17830
Activities report on the Technical Highschool Twente (THT) CWD windmill project
[WM-090] N86-17889
World weather watch: On implementation
[WMO-839] N86-17958
Activities report in world meteorology
[WMO-844] N86-17959
INTERORBITAL TRAJECTORIES
Radiation exposure and performance of multiple burn LEO-GEO orbit transfer trajectories N86-17417
INTERPLANETARY FLIGHT
Interplanetary exploration-A challenge for photovoltaics N86-17861
INTERPOLATION
Numerical grid generation using algebraic and geometrical techniques N86-17288
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
Software for rootfinding and interpolation with Runge-Kutta-Sarafyan methods
[DE85-018113] N86-18070
INTERPROCESSOR COMMUNICATION
Parallel Cholesky factorization on a hypercube multiprocessor
[DE85-018121] N86-18002
The RAND-ABEL programming language: History, rationale, and design
[AD-A159821] N86-18010
INTERRUPTION
Syntax and defining equations for an interrupt mechanism in process algebra
[CWI-CS-R8503] N86-18092
INTERSTELLAR EXTINCTION
Comparison of optical extinction and molecular line intensities in the Chamaeleon 1 dark cloud N86-18263
INTERSTELLAR MASERS
Correlated variability in the W49N water maser source N86-18264
INTERSTELLAR RADIATION
Radiation exposure and performance of multiple burn LEO-GEO orbit transfer trajectories N86-17417
INTERVALS
Modified confidence intervals for the mean of an autoregressive process
[AD-A160055] N86-18107
INVARIANCE
Lorentz anomaly in arbitrary dimensions
[DE86-001332] N86-18116
INVERTED CONVERTERS (DC TO AC)
Multiprimary winding inverter with low harmonic content N86-17439
INVESTIGATION
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
Investigation of the quantum efficiency of optical heterodyne detectors
[NASA-CR-176489] N86-18179
INVISCID FLOW
Supersonic flow on axisymmetric blunt body N86-17268
Analysis of high Reynolds number transonic flow around an airfoil N86-17293
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699
ION BEAMS
Basic aspects of ion beam mixing
[DE85-018391] N86-18145
Radioactive ion beam research at LLNL
[DE85-018183] N86-18156
High temperature experiment for accelerator inertial fusion
[DE85-016553] N86-18191
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
ION ENGINES
Liquid metal field emission thrusters and ion sources: A review
[ESA-CR(P)-2078] N86-17470
ION IMPLANTATION
Further research on high open circuit voltage in silicon solar cells N86-17842
ION PROPULSION
Analysis of electric propulsion concepts for near-term mission application N86-17424
Liquid metal field emission thrusters and ion sources: A review
[ESA-CR(P)-2078] N86-17470

ION SOURCES
New delayed neutron precursors measured at TRISTAN
[DE85-017918] N86-18141
IONIC COLLISIONS
Basic aspects of ion beam mixing
[DE85-018391] N86-18145
IONIZATION
Position sensitive gas counter readout system
[DE85-017953] N86-17713
IONIZING RADIATION
Gated strip proportional detector
[DE85-017757] N86-17708
IONOSPHERE
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
Activities report in geophysics
[UIO-SR-85-01] N86-18203
IONOSPHERIC DRIFT
Two and three dimensional particle simulation models for study of plasma microinstabilities
[DE86-000238] N86-18201
IONS
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
IRON ALLOYS
Creep-rupture behavior of iron superalloys in high-pressure hydrogen
[NASA-CR-175027] N86-17531
Heavy metal alloys containing 30% to 90% tungsten
[DE85-017896] N86-17546
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
IRON OXIDES
Influence of catalytic additions on ferric-oxide reduction
[BLL-BISI-23009-(9022.060)] N86-17526
IRON 57
Hyperfine fields in Fe-Ni-X alloys and their application to a study of tempering of 9Ni steel
[DE85-011517] N86-17538
ISOTHERMAL FLOW
A basic computer code for industrial burner designs. Part 1: Capability test in isothermal swirling flows
N86-17284
ISOTROPISM
Nonlinear refractive index measurements of isotropic liquid crystals
[AD-A159519] N86-18209
ITERATIVE SOLUTION
Inverse method with geometry constraints for transonic airfoil design
[NLR-MP-84069-U] N86-17311
An improved pressure iteration procedure for the SOLA algorithm applied to the solution of the incompressible Navier-Stokes equations
[VKI-TM-35] N86-17682
Multigrid solution of the steady Euler equations
[CWI-NM-R8505] N86-17696
Bifurcation and stability, a numerical approach
[NLR-MP-84078-U] N86-18085
Fast magnetic systems, basic research
[BMFT-FB-T-85-102] N86-18117
IUE
Preliminary results of the study of ultraviolet background with IUE
[PREPRINT-447] N86-18279

J

J INTEGRAL
Closure of fatigue cracks at high strains
[NASA-CR-175021] N86-17788
JAMMING
The use of filters in digital coherent receivers operating in a jamming and noise environment
[AD-A159792] N86-17596
JET ENGINE FUELS
Microbial problem with storage of jet fuel in rock caverns: Development of a process for purification of corrosive jet fuel --- based on the use of powdered silver
[FOA-A-40051-B4] N86-17579
JET FLOW
The numerical calculation of particle-size distributions in 2D jets and boundary layers
[CFD/85/6] N86-17688
JET PROPULSION
A wind tunnel investigation of the effect of a propulsive jet on controls located on a conical afterbody in subsonic and supersonic free streams
[FFA-TN-1985-11] N86-17318
JOINING
Demonstrated results of welded and soldered interconnections N86-17866
JOINTS (JUNCTIONS)
Hoops
[CETIM-13-N-243] N86-17767

K

KALMAN FILTERS
Comparison of a jump-diffusion tracker with a Kalman tracker: An evaluation with emphasis on air traffic control
[NLR-TR-83063-U] N86-17335
An efficient filter for abruptly changing systems
[NLR-MP-84071-U] N86-18056
KAOLINITE
Recent experience in the RAE 5 meter wind tunnel of a china clay method for indicating boundary layer transition
[RAE-TM-AERO-2007] N86-17306
KARMAN VORTEX STREET
Sound excitation during vortex-airfoil interaction
[MPIS-MITT-80] N86-18130
KERNEL FUNCTIONS
On the asymptotic properties of a kernel-type quantile estimator from censored samples
[AD-A160302] N86-18108
KEVLAR (TRADEMARK)
Report on Kevlar -49 composite pressure vessel safety technology program N86-17412
Fatigue performance of prestressed composite pressure vessels
[SNIAS-852-430-114] N86-17494
KINEMATICS
The dynamics of mechanisms with deformable links
[LAB-REPT-758] N86-17790
The dynamics of mechanisms with deformable links
N86-17791
Finite element kinematic analysis of spatial mechanisms N86-17792
The SPACAR program system for the analysis of the motion of spatial mechanisms. User manual
[LAB-REPT-739] N86-17793
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 1: Kinematics of Basin-Range intraplate extension
[NASA-CR-176498] N86-17928
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 3: Kinematics of Great Basin intraplate extension from earthquake, geodetic and geologic information
[NASA-CR-176500] N86-17930
Compound nucleus studies with reverse kinematics
[DE85-016630] N86-18138
KINETIC EQUATIONS
Aspects of turbulence in nonlinear systems, year one
[DE85-016253] N86-18188
Antenna analysis and boundary conditions for Alfven wave studies in tokamaks
[DE85-018011] N86-18196
KLYSTRONS
A high power, pulsed microwave tube for a synthetic aperture radar electrical model. Phase 2: Manufacture and test
[EVT-852] N86-17632
KOLMOGOROFF THEORY
Development of a two-scale turbulence model and its application N86-17662
KRYPTON FLUORIDE LASERS
Design and performance of large area monolithic electron guns for the Aurora KrF laser system
[DE85-014112] N86-17734

L

LABORATORY EQUIPMENT
The design of shielded enclosures, especially for high-voltage laboratories
[S/T-REPT-VOL-2-NO-11] N86-17360
Bio-Observation Subsystem (BOSS) feasibility study --- Spacelab
[BOSS-010-MT] N86-17362
LAKES
Water resources data for Oklahoma, water year 1983
[PB85-236289] N86-17834
LAMELLA (METALLURGY)
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
LAMINAR BOUNDARY LAYER
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
LAMINAR FLOW
Numerical solution of viscous compressible flows past an airfoil using unconditionally stable explicit method
N86-17290
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
A study of high Reynolds number laminar separation
N86-17302
Laminar forced convective heat transfer of power law fluids in isosceles triangular ducts with peripheral wall conduction N86-17659
Laminar flow in a driven square cavity
[PDR/CFDU/IC/17] N86-17689
LAMINAR MIXING
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
LAMINATES
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena
[NASA-CR-176485] N86-17475
Physical and chemical characterization of multilayered structures
[DE85-016922] N86-17624
Wave propagation in thick damped laminated plates
[AASU-344] N86-17787
LAND ICE
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
LAND USE
Integration of remote sensing data and cartographic data bases into a land information system N86-17820
Study of a land use of synthetic aperture radar, executive summary
[ESA-CR(P)-2067-VOL-1] N86-17825
Study of a land use of synthetic aperture radar. Volume 1: Main report
[ESA-CR(P)-2067-VOL-2] N86-17826
LANDFORMS
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815
LANDING GEAR
Estimation of load exceedances of an aircraft under carriage with nonlinear properties excited by random runway unevenness
[NLR-TR-84030-U] N86-17348
LANDING LOADS
Estimation of load exceedances of an aircraft under carriage with nonlinear properties excited by random runway unevenness
[NLR-TR-84030-U] N86-17348
LANDMARKS
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815
LAP JOINTS
Fatigue rated fastener systems in aluminum alloy structural joints --- aircraft structures
[NLR-MP-83045-U] N86-17809
LASER ALTIMETERS
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
LASER APPLICATIONS
Study of the surface heat treatment of cutting tools and samples of grooved cylinders made by a laser beam. Comparison with an electron beam
[REPT-1578] N86-17551
Intense excitation source of blue-green laser
[AD-A160303] N86-17733
LASER DOPPLER VELOCIMETERS
Investigation of an oblique shock wave/laminar boundary layer interaction using Laser Doppler Velocimetry (LDV)
[VKI-TN-152] N86-17680
Evaluation of data obtained from atmospheric laser Doppler velocimeter
[NASA-CR-178474] N86-17703
LASER GYROSCOPES
Construction of a measuring method using fiber optics and an LTN-90 laser gyro strapdown system for BO-195 helicopters
[DFVLR-MITT-85-10] N86-17333

LASER MATERIALS
TECATE: A code for anisotropic thermoelasticity in high-average-power laser technology, phase 1
[DE85-016067] N86-17736
LASER MODE LOCKING
A study of continuous wave lasing and modelocking in a neodymium-phosphate glass crystal N86-17729
LASER OUTPUTS
The 400-channel commutator for measurement of energy distribution in laser beam N86-17645
Dependence of error of measurement of relative energy or power density distribution over cross section of laser beam on space factor of multielement radiation transducer N86-17646
Photoelectric instrument for measuring relative energy density distribution in beams of pulse lasers N86-17647
Intense excitation source of blue-green laser
[AD-A160303] N86-17733
Apparatus for laser beam profile measurements
[DE85-017789] N86-17740
LASER PUMPING
Metrological provision for measurement of relative energy density distribution over beam cross section and of beam divergence in pulse lasers N86-17643
A study of continuous wave lasing and modelocking in a neodymium-phosphate glass crystal N86-17729
Theoretical studies of Resonance Enhance Stimulated Raman Scattering (RESRS) of frequency doubled Alexandrite laser wavelengths in cesium vapor
[NASA-CR-176464] N86-17731
LASER SPECTROSCOPY
Laser spectroscopy of sputtered atoms
[DE85-018388] N86-17517
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728
LASER TARGETS
Thermal transport, mass-ablation and preheat in laser-target experiments
[DE85-017584] N86-17742
LASER WELDING
In-process acoustic emission monitoring of laser welds
[DE85-017184] N86-17772
LASERS
Laser-assisted solar cell metallization processing
[NASA-CR-176457] N86-17883
LATHES
High speed steel working tools --- milling
[CETIM-102360] N86-17762
LATIN SQUARE METHOD
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017
LATTICE PARAMETERS
Structure of high-pressure KNO3-4
[DE85-018361] N86-18222
LAUNCH VEHICLES
Shuttle derived unmanned launch vehicle N86-17403
Regulatory aspects of commercial, space transportation N86-17409
LAWS
Theoretical and experimental investigations of a thermoplastic constitutive law
[RUB-IFM-MITT-43] N86-18233
LEACHING
Effects of acid rain on forest nutrient status
[DE85-018120] N86-17911
LEADING EDGES
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
LEARNING
Computer-managed instruction: Crystallized and fluid intelligence
[AD-A160017] N86-18013
LEGAL LIABILITY
Systems safety: Phantom or reality
[SNIAS-852-422-103] N86-17330
LENS DESIGN
Anamorphic gradient index lens systems N86-18177
LEPTONS
Chiral symmetry on the lattice with Wilson fermions
[PREPRINT-452] N86-18080
LEUKOCYTES
HLA-D: The T cell perspective
[AD-A160019] N86-17976
LIBRARIES
Novel computer architectures for data storage and retrieval
[BLRDR-5845] N86-18005
LICENSING
Regulatory aspects of commercial, space transportation N86-17409
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport
[REPT-1] N86-17985
LIE GROUPS
Algorithmic orbit classification for connected solvable groups
[ZW-8411] N86-18072
Point-line characterizations of buildings
[CWI-PM-R8415] N86-18076
On the holomorphic continuation of the Iwasawa and a related decomposition
[CWI-PM-R8502] N86-18077
Integrability of two interacting N-dimensional rigid bodies
[PREPRINT-450] N86-18079
Lie-isotopic algebraic approach to formal nonpotential scattering theory
[PREPRINT-456] N86-18081
An outline of the practical use of Lie series
[ESA-STR-215] N86-18082
LIFE (DURABILITY)
Tool wear monitoring systems
[CETIM-100560] N86-17761
High speed steel working tools --- milling
[CETIM-102360] N86-17762
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures N86-17771
Reusable software: Trade-off analysis and a new approach
[AD-A159813] N86-18009
LIFE SCIENCES
Activities report in space research in Norway
[SAD-125-T] N86-17361
LIFT
Low speed aerodynamic characteristics of a two-dimensional sail wing with adjustable slack of the sail
[VTH-LR-307] N86-17314
LIFT DEVICES
Investigations on efficient numerical method for subsonic lifting surfaces N86-17285
Application of a constrained inverse method in the aerodynamic design of a low speed wing-slat configuration
[NLR-TR-83123-U] N86-17320
A system for computer aided analysis and design of multielement airfoils: MAD
[NLR-TR-83136-U] N86-17321
LIFT DRAG RATIO
Numerical simulation of flow around circular cylinders at high Reynolds numbers --- offshore structures
[Z-50551] N86-17697
LIFTING BODIES
Investigations on efficient numerical method for subsonic lifting surfaces N86-17285
Subsonic unsteady aeroelasticity: The potential method applied to lifting surfaces
[ONERA-RT-21/3064-RY-045-R] N86-17315
Unsteady three-dimensional surface theory with the free surface effect: Supercritical case
[ONERA-P-1984-1] N86-17683
The steady lifting surface theory with a free-surface --- hydrodynamic forces
[ONERA-P-1984-2] N86-17684
LIGANDS
Sample selection and testing of separation processes
[NASA-CR-176569] N86-17502
LIGHT (VISIBLE RADIATION)
White light optical information processing
[AD-A160311] N86-18180
Systematic view of optical absorption spectra in the actinide series
[DE85-018406] N86-18225
LIGHT BEAMS
Weld seam-tracking with an optical sensor using structured light N86-17764
LIGHTNING
Characterization of the electromagnetic radiation preceding lightning
[ONERA-NT-1985-1] N86-17960
LIGNIN
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
LINE SPECTRA
Investigation of the quantum efficiency of optical heterodyne detectors
[NASA-CR-176489] N86-18179
LINEAR ACCELERATORS
An automated charge monitoring system for the NPL linear accelerator
[NPL-RS(EXT)80] N86-18136
High temperature experiment for accelerator inertial fusion
[DE85-016553] N86-18191
Neon gas puff Z-pinch implosions on Proto-2
[DE85-017636] N86-18194
LINEAR EQUATIONS
Upsetting of viscoplastic medium between two rigid plates in presence of friction
[BLL-M-36390-(5828.4)] N86-17745
LINEAR PREDICTION
On the prediction and the spectral factorization of stationary processes in the broad sense with two discrete parameters
[ENST-85C002] N86-18074
LINEAR VIBRATION
Development and application of a direct algorithm adapted to the discrete Fourier transform for the determination of the modal parameters of linear vibration systems
[RUB-IFM-MITT-42] N86-17786
LININGS
Report on Kevlar -49 composite pressure vessel safety technology program N86-17412
LINKAGES
The dynamics of mechanisms with deformable links
[LAB-REPT-758] N86-17790
The dynamics of mechanisms with deformable links N86-17791
LIPSCHITZ CONDITION
Harmonic analysis and partial differential equations
[CTH-MATH-1985-03] N86-18062
Dirichlet problem for Lipschitz domain. The setup N86-18063
Recent progress on boundary value problems on Lipschitz domains
[MATH-REPT-84-133] N86-18064
LIQUID CHROMATOGRAPHY
Dose of PES (plasticizer) in a BSL914 resin using different standards --- liquid chromatography
[CEAT-NT-15/M/85] N86-17521
LIQUID CRYSTALS
Melt processable liquid crystal polymers. Part 1: A review of current developments
[RARDE-MEMO-50/84-PT-1] N86-17566
Nonlinear refractive index measurements of isotropic liquid crystals
[AD-A159519] N86-18209
LIQUID FLOW
Development of a continuous-flow fluidic pump
[DE85-018152] N86-17755
LIQUID HYDROGEN
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387
Solar thermal propulsion for planetary spacecraft N86-17423
LIQUID METALS
Liquid metal field emission thrusters and ion sources: A review
[ESA-CR(P)-2078] N86-17470
LIQUID OXYGEN
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387
Oxygen/hydrocarbon combustion devices technology N86-17407
Advanced seals for Liquid Oxygen (LOX) turbopumps N86-17408
LIQUID PHASE EPITAXY
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
LIQUID ROCKET PROPELLANTS
Corrosion of metals by hydrazine N86-17395
The effects of surface pretreatment and nitrogen tetroxide purification on the corrosion rate of Type 304L stainless steel N86-17396
Bipropellant Earth storable rocket engines for satellites: A 1985 update N86-17398
Flight experience with an integrated bipropellant propulsion system: INSAT 1 N86-17431
LIQUID-LIQUID INTERFACES
One-dimensional prediction of the interface motion separating two immiscible fluids enclosed in a long duct
[PDR/CFDU/IC/19] N86-17690
LIQUIDS
Thermodynamic properties and microscopic structure of fluids and fluid mixtures
[DE85-016482] N86-18234
LITHIUM
Lithium soft X-ray laser N86-17730
Disorder and transport in lithium/aluminum
[DE85-018389] N86-18231
LITHOLOGY
Advanced techniques for lithologic and fracture analysis utilizing thematic mapper and topographic data
[DE85-018220] N86-17935

LITHOSPHERE
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 1: Kinematics of Basin-Range intraplate extension
[NASA-CR-176498] N86-17928
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 2: Lithospheric structure, seismicity, and contemporary deformation of the United States Cordillera
[NASA-CR-176499] N86-17929
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 3: Kinematics of Great Basin intraplate extension from earthquake, geodetic and geologic information
[NASA-CR-176500] N86-17930
LOAD TESTING MACHINES
High strain-rate properties of materials
[BR94080] N86-17785
LOAD TESTS
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 1: Background and fatigue evaluation
[RAE-TR-84084] N86-17336
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 2: Final definition of Helix and Felix
[RAE-TR-84085] N86-17337
LOADING RATE
Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799
LOADS (FORCES)
Vibrational stability behaviour of orthotropic plates in steel roads bridges: Application for financial support of a research project by the ECSC (European Coal and Steel Community)
[BLL-TRANS-3225-(9057.2451)] N86-17778
MFTF-B load-flow analysis: A mainframe application implemented on a personal computer
[DE85-018155] N86-18023
LOGIC PROGRAMMING
Notes on logic --- artificial intelligence
[NPL-DITC-65/1985] N86-18051
LONG TERM EFFECTS
Development of thin-film solar cells based on amorphous silicon
[BMFT-FB-T-85-096] N86-17893
LORENTZ TRANSFORMATIONS
Lorentz anomaly in arbitrary dimensions
[DE86-001332] N86-18116
LOW COST
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879
LOW FREQUENCIES
Shock response spectrum at low frequencies
[DE85-018273] N86-17797
LOW SPEED
Low speed aerodynamic characteristics of a two-dimensional sail wing with adjustable slack of the sail
[VTH-LR-307] N86-17314
Slow motor: ISO round robin tests --- hydraulic motors
[CETIM-N-01270] N86-17587
LOW SPEED WIND TUNNELS
Activities report in aerospace research, with data concerning the scientific committee NLR-NIVR, international cooperation concerning AGARD, DNW, GARTEUR and cooperation with Indonesia N86-17588
Low Reynold's number boundary layers in a disturbed environment
[NASA-CR-175031] N86-17665
LOW TEMPERATURE
Low temperature methanol synthesis catalyst and process development
[DE85-017837] N86-17511
Experimental results on a low-temperature magnetic refrigerator
[DE85-017541] N86-17583
Method of measuring emittance of thermal insulation materials at low temperatures N86-17650
LOW THRUST PROPULSION
LOX/LH2 vane pump for auxiliary propulsion systems N86-17397
LUBRICANTS
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
LUBRICATION
Identification of tribological research and development needs for lubrication of advanced heat engines
[DE85-018154] N86-17756
LUMINOSITY
New results on Bhabha scattering at 29 GV
[DE85-018408] N86-18146
LUNGS
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981
LYMPHOCYTES
Clonal analysis of HLA-DR and -dQ associated determinants: Their contribution to dw specificities
[AD-A160059] N86-17977

M

MACHINE TOOLS
Machine imparting complex rotary motion for lapping a spherical inner diameter
[DE85-017790] N86-17754
MACHINING
Machine imparting complex rotary motion for lapping a spherical inner diameter
[DE85-017790] N86-17754
MAGNESIUM
Raman spectroscopic study of molten salt electrolysis of light metals
[DE85-017480] N86-17509
MAGNESIUM COMPOUNDS
Development of refractory composites with improved fracture toughness
[DE86-000257] N86-17479
MAGNETIC COILS
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114
MAGNETIC COMPRESSION
Magnetically focused liquid drop radiator
[DE85-017735] N86-17671
MAGNETIC CORES
Designing high frequency ac inductors using ferrite and Molypermalloy Powder Cores (MPP) N86-17452
MAGNETIC DOMAINS
New example of superconducting walls in the ferromagnet ErRh4B4
[DE85-018398] N86-18224
MAGNETIC FIELD CONFIGURATIONS
Axisymmetric tandem mirror stabilized by a magnetic limiter
[DE85-017349] N86-18192
Maryland controlled fusion research program. Volume 1
[DE85-018027] N86-18197
MAGNETIC FIELDS
Hyperfine fields in Fe-Ni-X alloys and their application to a study of tempering of 9Ni steel
[DE85-011517] N86-17538
Magnetization reversal in triaxial single-domain particles N86-17651
Determining spatial orientation of axes of elliptical magnetic field N86-17652
Magnetic field of excitation winding in experimental cryogenic turbogenerator N86-17653
Reversible component of magnetic induction in magnetically soft materials during magnetization reversal N86-17654
Microwave detector
[DE85-017797] N86-17711
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114
Axisymmetric tandem mirror stabilized by a magnetic limiter
[DE85-017349] N86-18192
Simultaneous measurement of current and plasma density profiles in the TEXT Tokamak
[DE85-017679] N86-18200
MAGNETIC FLUX
Equivalent-circuit calculations for built-up magnetic structures by projection method N86-17655
Experiences with the Declination-Inclination (DI) fluxgate magnetometer including theory of the instrument and comparison with other methods
[DMI-GEOPHYS-PAPERS-R-71] N86-17727
MAGNETIC INDUCTION
Determining spatial orientation of axes of elliptical magnetic field N86-17652
Reversible component of magnetic induction in magnetically soft materials during magnetization reversal N86-17654
MAGNETIC MEASUREMENT
Nonintrusive shaft speed sensor N86-17406
Experiences with the Declination-Inclination (DI) fluxgate magnetometer including theory of the instrument and comparison with other methods
[DMI-GEOPHYS-PAPERS-R-71] N86-17727
MAGNETIC MOMENTS
Magnetization reversal in triaxial single-domain particles N86-17651
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152
MAGNETIC MONOPOLES
Magnetic charge and non-associative algebras
[DE85-009931] N86-18068
Indiana University High Energy Physics Group
[DE85-012000] N86-18169
MAGNETIC PROPERTIES
Rare earth chemical and physical metallurgy
[DE85-015536] N86-17537
Magnetically focused liquid drop radiator
[DE85-017735] N86-17671
MAGNETIC RESONANCE
Inverse Faraday effect in hemoglobin detected by Raman spectroscopy: An example of magnetic resonance Raman activity
[AD-A159806] N86-17975
MAGNETIC STORMS
Surface potential monitor --- spacecraft surfaces
[SEP-TS/SE/RE/10418/84] N86-17378
MAGNETIC TRANSDUCERS
Dependence of error of measurement of relative energy or power density distribution over cross section of laser beam on space factor of multielement radiation transducer N86-17646
Photoelectric instrument for measuring relative energy density distribution in beams of pulse lasers N86-17647
MAGNETIZATION
Coupled electron-nuclear magnetism and neutron diffraction
[DE85-016479] N86-17539
Magnetization reversal in triaxial single-domain particles N86-17651
Reversible component of magnetic induction in magnetically soft materials during magnetization reversal N86-17654
Equivalent-circuit calculations for built-up magnetic structures by projection method N86-17655
MAGNETOHYDRODYNAMIC FLOW
Cyclic mean flows in the Sun as a probe of the dynamo action N86-18259
MAGNETOHYDRODYNAMIC GENERATORS
Channel design for closed cycle MHD
[NLR-MP-84053-U] N86-18205
MAGNETOHYDRODYNAMIC STABILITY
Drift modes with differential rotation and passing electrons
[DE85-017243] N86-18151
Axisymmetric tandem mirror stabilized by a magnetic limiter
[DE85-017349] N86-18192
Two and three dimensional particle simulation models for study of plasma microinstabilities
[DE86-000238] N86-18201
MAGNETOHYDRODYNAMIC WAVES
Antenna analysis and boundary conditions for Alfven wave studies in tokamaks
[DE85-018011] N86-18196
MAGNETOHYDRODYNAMICS
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018082] N86-18189
Three dimensional toroidal magnetohydrodynamic particle code
[DE86-000239] N86-18202
MAGNETOMETERS
Experiences with the Declination-Inclination (DI) fluxgate magnetometer including theory of the instrument and comparison with other methods
[DMI-GEOPHYS-PAPERS-R-71] N86-17727
MAGNETOSPHERE
Generation of magnetic field aligned currents, parallel electric fields, and inverted-V structures by plasma pressure inhomogeneities in the magnetosphere
[KGI-PREPRINT-073] N86-17941
Generation of magnetospheric radiation by decay of Bernstein waves
[KGI-PREPRINT-076] N86-17942
Activities report in geophysics
[UIO-SR-85-01] N86-18203
MAGNITUDE
Determination of spectral distributions and instrumental magnitudes of planets
[ESA-STR-214] N86-18280
MAIN SEQUENCE STARS
Optical and infrared photometry of southern early-type shell stars and pre-main-sequence variables N86-18274
MAINTENANCE
Introduction to deployable recovery systems
[DE86-000048] N86-17310
International Symposium on Mechanical Properties of Special Concrete
[PB85-234961] N86-17770

MAN MACHINE SYSTEMS
Human-machine interfaces for teleoperators: An overview of research and development at the Oak Ridge National Laboratory. Consolidated Fuel Reprocessing Program
[DE85-017713] N86-17990
A Computer Aided Design (CAD) system as a tool for the ergonomist in developing man-machine systems
[IZF-1985-10] N86-17993
Guide to the automation of data-processing centers --- meteorological data
[WMO-636] N86-18003
MANAGEMENT PLANNING
Space Station Engineering and Technology Development. Proceedings of the Panel on Program Performance and Onboard Mission Control
[NASA-CR-176484] N86-17372
Personnel activities report in aerospace research N86-18243
MANGANESE
Survey of physical property data for several alloys
[DE85-018138] N86-17542
Development of cobalt-free high grade permanent magnets on the basis of MnAl alloys
[BMFT-FB-T-85-099] N86-17559
MANIPULATORS
Advanced servomanipulator development
[DE85-017720] N86-17989
MANUFACTURING
Ceramic fiber composites: Manufacturing and performances
[SNIAS-852-430-118] N86-17497
Design of nonaxysymmetric structures (turbojet engine nacelle element)
[SNIAS-852-430-119] N86-17498
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
MAPPING
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures N86-17771
Development of scanner digital image acquisition for photogrammetry
[MBB-UA-876/85] N86-17827
Protein mapping and the problem of complexity in molecular biology
[DE85-018349] N86-17979
MARAGING STEELS
Study of the influence of pitting corrosion on the fatigue characteristics of Marvac 18
[M2-666500] N86-17556
MARECS MARITIME SATELLITES
MARECS and ECS: The first few years in orbit --- power subsystems N86-17433
MARINE ENVIRONMENTS
A method for estimating atmospheric stability using sodar measurements --- in diffusion control at nuclear power plants
[FOA-E-40020] N86-17944
Assessment of the performance of an in-field Gaussian plume/puff model for overwater use
[AD-A160032] N86-17955
Bibliography of research on ocean fronts, 1964-1984
[AD-A160040] N86-17970
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123
MARKING
Shape and depth of the crystallisation front in steel ingots remelted by the electroslag method determined with the aid of radioactive phosphorus
[BLL-DRIC-T-TR-7561-(3623.66)] N86-17525
MARKOV CHAINS
An efficient filter for abruptly changing systems
[NLR-MP-84071-U] N86-18056
MARKOV PROCESSES
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
Comparison of a jump-diffusion tracker with a Kalman tracker: An evaluation with emphasis on air traffic control
[NLR-TR-83063-U] N86-17335
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100
Random parameter Markov population process models and their likelihood, bayes and empirical bayes analysis
[AD-A159812] N86-18102
Brownian motion
[AD-A160020] N86-18103
A Markovian model, with state-dependent parameters, of a transactional system supported by checkpointing and recovery strategies --- computer networks N86-18110
Markov tree model of transport in area preserving maps
[DE86-000237] N86-18238
On the stochastic quantization of field theory
[PREPRINT-457] N86-18241
MARYLAND
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822
MASS FLOW RATE
Test of a measuring instrument composed of two local flow turbines, two drag bodies, a full flow turbine and a two-beam densitometer, of the Large Pressurized Water Reactor Offnormal Behavior Investigation (LOBI) instrumentation in a transient two-phase flow
[KFK-3877] N86-17694
MASS SPECTRA
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
MASS SPECTROSCOPY
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906
MASS TRANSFER
Analysis of simultaneous heat and mass transfer in soils below solar ponds
[DE85-012163] N86-17877
MATERIALS HANDLING
Possibilities of protection from abrasive and adhesive wear
[BLL-RISLEY-TR-5166-(9091.9F)] N86-17744
Fluidizing device for solid particulates
[DE85-006504] N86-17752
MATERIALS RECOVERY
On recovery of platinum from spent catalysts
[CE-TRANS-8042] N86-17499
MATHEMATICAL LOGIC
Notes on logic --- artificial intelligence
[NPL-DITC-65/1985] N86-18051
MATHEMATICAL MODELS
Investigations on efficient numerical method for subsonic lifting surfaces N86-17285
Strategies for dynamic modeling of a helicopter structure
[SNIAS-852-210-101] N86-17350
Effect of dynamic stall and elastic parameters on the fundamental mechanisms of helicopter vibrations
[AD-A160022] N86-17355
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
Towards digital computer simulation of the dynamics of flexible spacecraft
[NLR-TR-83106-U] N86-17376
Moonburner: An ultra-high web fraction grain design N86-17392
Power switching cell modeling: An easy way --- spacecraft power supplies N86-17460
Modeling and implementation of a digitally controlled power converter using duty ratio quantization --- spacecraft power supplies N86-17461
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477
Enhancing the impact toughness of low alloy steel by micro-alloying and modification
[BLL-M-36490-(5828.4)] N86-17522
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544
Calculations of transient fields in the Felix experiments at Argonne using null field integrated techniques
[DE85-017617] N86-17599
A model for the analysis of orthogonal modulation methods for digital transmission
[FI-445-TBR-23] N86-17602
A synthetic aperture radar system simulation model: SARSIM
[DFVLR-MITT-85-11] N86-17607
Modelling transmission gates in ELLA
[AD-A159557] N86-17618
Condensation of the underside of a horizontal surface in a closed vessel
[DE85-018379] N86-17674
A two-dimensional model for boiling in an active particle bed: BOIL
[VKI-TN-153] N86-17681
Models and prediction of turbulent flow with particles
[ONERA-RTS-21/7135-EY] N86-17692
Limitations in variable conductance heat pipe performance and control predicted by the current steady-state model developed at NLR
[NLR-MP-84009-U] N86-17695
Development of a continuous-flow fluidic pump
[DE85-018152] N86-17755
Heat transfer in internal combustion engines
[DE85-011495] N86-17757
Some aspects of the dynamic behavior of an assembly robot N86-17765
Slow crack growth: Macroscopic and microscopic aspects
[DE85-011165] N86-17798
Numerical simulation of impact tests and comparison of behavior laws
[SNIAS-852-320-101] N86-17813
Mathematical model for the distribution of the long-term efficiency of phase-change materials and its application in heat-storage
[DE85-016451] N86-17873
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913
Assessment of the performance of an in-field Gaussian plume/puff model for overwater use
[AD-A160032] N86-17955
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017
ANOVA model fitting via sparse matrix computations
[DE85-017070] N86-18069
Uncertainty estimation from system identification
[OUEL-1570/85] N86-18075
Parametric study of the amplification factor in the energy balance method
[TI85-010472] N86-18111
Sound excitation during vortex-airfoil interaction
[MPIS-MITT-80] N86-18130
The Smoke Transmission and Reflection Threshold (START) model; the Oldebroek (Netherlands) 2 trials, May 1981
[IZF-1984-22] N86-18187
Two and three dimensional particle simulation models for study of plasma microinstabilities
[DE86-000238] N86-18201
Markov tree model of transport in area preserving maps
[DE86-000237] N86-18238
MATHEMATICAL PROGRAMMING
Subroutine package for Bessel functions of a complex argument and nonnegative order
[DE86-000047] N86-18071
MATRICES (MATHEMATICS)
Calculation methods for short-circuit currents in three-phase bridge rectifier circuits N86-17444
Development of an accurate algorithm for exp(Bt)
[AD-A160060] N86-18015
ANOVA model fitting via sparse matrix computations
[DE85-017070] N86-18069
Algorithmic orbit classification for connected solvable groups
[ZW-8411] N86-18072
An automatic proof procedure for several geometries (report 1)
[REPT-84-42] N86-18099
MAXIMUM LIKELIHOOD ESTIMATES
Random parameter Markov population process models and their likelihood, bayes and empirical bayes analysis
[AD-A159812] N86-18102
MEASUREMENT
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115
On the stochastic quantization of field theory
[PREPRINT-457] N86-18241
MEASURING INSTRUMENTS
Query language for the Profiler data system
[PB85-240190] N86-17965
MECHANICAL DEVICES
The dynamics of mechanisms with deformable links
[LAB-REPT-758] N86-17790
The dynamics of mechanisms with deformable links N86-17791
Finite element kinematic analysis of spatial mechanisms N86-17792
The SPACAR program system for the analysis of the motion of spatial mechanisms. User manual
[LAB-REPT-739] N86-17793
MECHANICAL DRIVES
Breadboard development of a hydraulically coupled free piston engine heat pump compressor
[DE85-005242] N86-17874
MECHANICAL ENGINEERING
Activities report of the Department of Engineering N86-18255
MECHANICAL IMPEDANCE
Study of plate impedances
[ESA-CR(P)-2086] N86-17802

MECHANICAL MEASUREMENT
Analysis in simulated space environment of composite material behavior
[SNIAS-852-430-116] N86-17495
MECHANICAL OSCILLATORS
A pendulum impactor for measuring the resistance of materials to jerk strains
[FOA-C-20577-D4] N86-17725
MECHANICAL PROPERTIES
Ceramic composites made by sol-gel processing
[SNIAS-852-430-103] N86-17491
Enhancing the impact toughness of low alloy steel by micro-alloying and modification
[BLL-M-36490-(5828.4)] N86-17522
The mechanical property data base from a cooperative program on first generation PM (Powder Metallurgy) aluminums
[AD-A159779] N86-17534
Influence of the present practice of heat straightening of thick steel plates (over 20 mm) on the mechanical properties
[CETIM-100-840] N86-17560
International Symposium on Mechanical Properties of Special Concrete
[PB85-234961] N86-17770
MELTING
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
MELTS (CRYSTAL GROWTH)
Melt processable liquid crystal polymers. Part 1: A review of current developments
[RARDE-MEMO-50/84-PT-1] N86-17566
MEMORY (COMPUTERS)
Recirculating cross-correlation detector
[DE85-017782] N86-17709
MERCURY (METAL)
The role of solvent reorganization dynamics in electron-transfer processes. Theory-experiment comparisons for electrochemical and homogeneous electron exchange involving metallocene redox couples
[AD-A160034] N86-17504
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544
MESONS
The F meson background and F candidates in 360 GeV c/Pi(-) p and pp interactions
[USIP-85-15] N86-18174
METAL COATINGS
Metallizing of fiber reinforced composites
[MBB-Z-46/48] N86-17482
METAL DRAWING
Applications of microalloyed steels to stamping
[CETIM-13-K-301] N86-17557
METAL FILMS
Metal film deposition by laser breakdown chemical vapor deposition
[DE85-017554] N86-17738
METAL IONS
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds
[DE85-017094] N86-17505
METAL JOINTS
Assembling with use of permanent deformation
[CETIM-13-N-283] N86-17812
METAL PLATES
Influence of the present practice of heat straightening of thick steel plates (over 20 mm) on the mechanical properties
[CETIM-100-840] N86-17560
METAL SHEETS
Robotic deburring: A bibliography
[DE85-015760] N86-17750
METAL SURFACES
Theoretical investigations of metal surfaces N86-18206
METAL WORKING
Vacuum arc remelting: An overview
[DE85-016458] N86-17751
METALLIZING
Metallizing of fiber reinforced composites
[MBB-Z-46/48] N86-17482
Laser-assisted solar cell metallization processing
[NASA-CR-176457] N86-17883
METALLOGRAPHY
Spectral analysis and metallographic investigations of corrosion and precipitation products of high temperature alloys
[JUEL-1975] N86-17553
METALS
Upsetting of viscoplastic medium between two rigid plates in presence of friction
[BLL-M-36390-(5828.4)] N86-17745
Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
[MBL-1985-6] N86-17980
Activities report in fundamental research on matter (FOM) N86-18118
METEOROLOGICAL PARAMETERS
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951
Limited surface observations climatic summary LISOCS. Gilze-Rijen, Netherlands
[AD-A159863] N86-17952
Revised Uniform Summary of Surface Weather Observations, Sparrevohn AFS, Alaska
[AD-A159864] N86-17953
Revised Uniform Summary of Surface Weather Observations, Pease AFB, New Hampshire
[AD-A159865] N86-17954
International list of selected, supplementary and auxiliary ships --- WMO
[WMO-47-ED-85] N86-17971
METEOROLOGICAL SERVICES
Activities report in world meteorology
[WMO-644] N86-17959
Guide to the automation of data-processing centers --- meteorological data
[WMO-636] N86-18003
METEOROLOGY
Fluid modeling of flow and dispersion in the atmosphere: Historical notes N86-17903
Influence of a large sulfur dioxide point source on mesoscale rainwater chemistry
[DE85-018215] N86-17908
Query language for the Profiler data system
[PB85-240190] N86-17965
METHANE
Low temperature methanol synthesis catalyst and process development
[DE85-017837] N86-17511
METHODOLOGY
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017875] N86-17956
Method for improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system
[DE85-017723] N86-17978
Method of synthesizing and growing copper-indium-diselenide (CuInSe2) crystals
[DE85-017729] N86-18215
METHYLENE
Investigation of the dynamics of selectively rotation-vibrationally excited difluoromethylene
[MPIS-5/1985] N86-18160
MICE
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981
MICHELSON INTERFEROMETERS
Preparation of the helium-cooled German Infrared Laboratory (GIRL) interferometer for scientific use on Spacelab
[MPE-192] N86-17721
MICHIGAN
Water resources data for Michigan, water year 1984
[PB85-237741] N86-17835
North Central regional geologic characterization report. Volume 2: Plates
[DE86-000419] N86-17939
MICROCRACKS
Closure of fatigue cracks at high strains
[NASA-CR-175021] N86-17788
MICROCRYSTALS
Corrosion of metals by hydrazine N86-17395
MICROELECTRONICS
Microelectronic image sensors: A report from the Charge Transfer Device (CTD) team at FOA 3
[FOA-C-30391-E1,E3] N86-17631
MICROPARTICLES
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes
[AD-A158468] N86-17533
MICROPROCESSORS
Microprocessor control of wind-driven induction generators N86-18050
MICROSCOPY
Bio-observation subsystem, phase A study, executive summary --- Spacelab
[REPT-648-DT-6-ISSUE-1] N86-17364
MICROSTRUCTURE
Corrosion of metals by hydrazine N86-17395
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes
[AD-A158468] N86-17533
Self-propagating reactions for synthesis of high temperature materials
[AD-A159869] N86-17535
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548
Chemical and microstructural effects on the diffusional creep behaviour of AISI type 316 stainless steel
[AERE-R-11322] N86-17563
The influence of heat affected zone microstructures on the ductility and hydrogen embrittlement of 9 percent Cr 1 percent Mo steel
[AERE-R-11473] N86-17564
High-field ZnO varistors: microstructures and properties
[DE85-018136] N86-17626
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769
MICROWAVE AMPLIFIERS
A pulsed 8 W FET power amplifier at 9.4 Ghz
[FOA-C-30402-E] N86-17613
MICROWAVE ANTENNAS
Beam steerable microwave antenna for automotive radar application N86-17591
One-channel adaptive antenna for troposhere microwave relay lines N86-17642
MICROWAVE RADIOMETERS
Results of solar research studies at the Metsaehovi (Finland) radio research station N86-18260
Solar 160 min oscillation at microwave N86-18261
MICROWAVE SENSORS
Nonintrusive shaft speed sensor N86-17406
Microwave sensor design using CAD techniques
[AD-A159518] N86-17617
Microwave detector
[DE85-017797] N86-17711
MICROWAVE TRANSMISSION
Microwave electric propulsion for orbit transfer applications N86-17429
One-channel adaptive antenna for troposhere microwave relay lines N86-17642
Microwave detector
[DE85-017797] N86-17711
MILITARY AIR FACILITIES
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
MILITARY HELICOPTERS
Helicopter cockpit organization for night vision
[SNIAS-852-210-103] N86-17996
MILITARY OPERATIONS
The RAND-ABEL programming language: History, rationale, and design
[AD-A159821] N86-18010
MILITARY SPACECRAFT
Future Air Force space power needs N86-17840
MILLIMETER WAVES
A single-balanced mixer for the Ka band
[FOA-C-30407-E] N86-17638
MILLING (MACHINING)
High speed steel working tools --- milling
[CETIM-102360] N86-17762
MINICOMPUTERS
Error propagation in a digital avionic processor: A simulation-based study
[NASA-CR-176501] N86-17351
MINIMAX TECHNIQUE
Numerical integration of retarded differential equations with periodic solutions
[CWI-NM-R8502] N86-18086
MINNESOTA
North Central regional geologic characterization report. Volume 2: Plates
[DE86-000419] N86-17939
MIRROR FUSION
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114
MIRRORS
Sputter deposition system for controlled fabrication of multilayers
[DE85-017521] N86-17582
Metrological provision for measurement of relative energy density distribution over beam cross section and of beam divergence in pulse lasers N86-17643
Thin film coatings for improved alpha/epi N86-17867
MISSILES
Electromagnetic pulse (EMP): Exposure of missile 56 in EMP simulator sapiens
[FOA-C-30398-A3] N86-17605

MISSION PLANNING
X-ray satellite
[NASA-TM-77997] N86-17370
Space Station Engineering and Technology Development. Proceedings of the Panel on Program Performance and Onboard Mission Control
[NASA-CR-176484] N86-17372
Orbital transfer vehicle engine integration study N86-17416
MATPWR: A mission analysis tool for LEO spacecraft power profiles computation N86-17469
MIXING
Basic aspects of ion beam mixing
[DE85-018391] N86-18145
MIXING CIRCUITS
A single-balanced mixer for the Ka band
[FOA-C-30407-E] N86-17638
MIXTURES
Flows of gas-particle mixtures with size-distribution N86-17274
MODELS
Amorphous aluminum hydroxide gels
[SNIAS-852-430-104] N86-17561
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
TRANSL: A subroutine library for PATRAN-G translators
[DE85-017634] N86-18020
Model for charge state distributions of heavy Coulomb explosion fragment ions
[DE85-018363] N86-18144
MODULATION TRANSFER FUNCTION
Heat image generators: State of affairs by the exploration of some possibilities
[IZF-1985-15] N86-17723
MODULATORS
Crossing channel waveguide electro-optic modulators N86-18176
MODULUS OF ELASTICITY
Statistics on the basic characteristics of carbon epoxy composites
[DGT-27.039] N86-17487
MOISTURE RESISTANCE
Effect of carbon fiber surface treatment on moisture absorption and interlaminar shear strength of carbon fibre/epoxy resin composites
[RAE-TR-84047] N86-17474
MOLDING MATERIALS
A method of fabricating silicon carbide mouldings
[BLL-RISLEY-TR-5206-(9091.9F)] N86-17747
MOLDS
Study of composite material curing molds
[DGT-26.817] N86-17486
MOLECULAR BEAM EPITAXY
Process for selectively patterning epitaxial film growth on a semiconductor substrate
[DE85-017733] N86-18216
MOLECULAR BEAMS
Vacuum MOCVD fabrication of high efficience cells N86-17848
MOLECULAR BIOLOGY
Protein mapping and the problem of complexity in molecular biology
[DE85-018349] N86-17979
MOLECULAR CLOUDS
Proceedings of the 19th Finnish Astronomers' Days
[REPT-S-162] N86-18258
Comparison of optical extinction and molecular line intensities in the Chamaeleon 1 dark cloud N86-18263
Optical study of Sharpless 252 (NGC 2175) N86-18268
MOLECULAR EXCITATION
Investigation of the dynamics of selectively rotation-vibrationally excited difluoromethylene
[MPIS-5/1985] N86-18160
MOLECULAR INTERACTIONS
Activities report in fundamental research on matter (FOM) N86-18118
MOLECULAR IONS
MUPPATS: A multiparticle 3D imaging detector system
[DE85-018451] N86-17715
Model for charge state distributions of heavy Coulomb explosion fragment ions
[DE85-018363] N86-18144
MOLECULAR ORBITALS
Gallium arsenide solar cell efficiency: Problems and potential N86-17843
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
MOLECULAR SPECTRA
Comparison of optical extinction and molecular line intensities in the Chamaeleon 1 dark cloud N86-18263
MOLECULAR STRUCTURE
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds
[DE85-017094] N86-17505
MUPPATS: A multiparticle 3D imaging detector system
[DE85-018451] N86-17715
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
MOLTEN SALTS
Raman spectroscopic study of molten salt electrolysis of light metals
[DE85-017480] N86-17509
MOLYBDENUM
Photodecomposition of Mo(CO)6 adsorbed on Si(100)
[DE85-017818] N86-17510
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548
Metal film deposition by laser breakdown chemical vapor deposition
[DE85-017554] N86-17738
MOLYBDENUM ALLOYS
The effect of quenching rate on the temperature and strain-rate sensitivity of uranium 2w/o molybdenum alloy
[OUEL-1577/85] N86-17528
The influence of heat affected zone microstructures on the ductility and hydrogen embrittlement of 9 percent Cr 1 percent Mo steel
[AERE-R-11473] N86-17564
MOLYBDENUM SULFIDES
Rhombohedral-to-triclinic phase transition in BaMo6S8
[DE85-018450] N86-18232
MONITORS
High flux photon beam monitor
[DE85-018202] N86-17714
MONOCHROMATORS
Sputter deposition system for controlled fabrication of multilayers
[DE85-017521] N86-17582
UHV piezoelectric translator
[DE85-018201] N86-17627
MONOMERS
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728
MONTE CARLO METHOD
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270
Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109
MORPHOLOGY
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
MOTION PICTURES
Films, catalog 1985 --- aerospace N86-18250
MOTORS
Slow motor: ISO round robin tests --- hydraulic motors
[CETIM-N-01270] N86-17587
MULTICHANNEL COMMUNICATION
Multichannel commutators of analog signals for measurement of energy distribution over beam cross section of pulse laser N86-17644
The 400-channel commutator for measurement of energy distribution in laser beam N86-17645
MULTIPLE BEAM INTERVAL SCANNERS
MMIC antenna technology development in the 30/20 gigahertz band
[NASA-TM-87192] N86-17368
MULTIPLEXING
Precision cryogenic temperature data acquisition system
[DE85-017847] N86-17712
MULTIPROCESSING (COMPUTERS)
Parallel Cholesky factorization on a hypercube multiprocessor
[DE85-018121] N86-18002
MULTISPECTRAL BAND SCANNERS
CNPq/INPE-LANDSAT system
[E86-10019] N86-17814
Analysis of the radiometric relation between false color aerial photographs and multispectral scanning (MSS) images
[MDLK-R-8337] N86-17829
Advanced techniques for lithologic and fracture analysis utilizing thematic mapper and topographic data
[DE85-018220] N86-17935
MULTIVARIATE STATISTICAL ANALYSIS
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100

N

N-TYPE SEMICONDUCTORS
Further research on high open circuit voltage in silicon solar cells N86-17842
NARROWBAND
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598
Correlation and collective modes in narrow band materials
[AD-A160310] N86-18210
Narrow band gap amorphous silicon semiconductors
[DE85-017753] N86-18218
NAVIER-STOKES EQUATION
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations N86-17273
Computation of the two-dimensinal incompressible Navier-Stokes equations using an implicit factored method N86-17277
Numerical analysis about flow over an aerofoil with a large angle of attack N86-17291
Numerical analysis of transonic flow around two-dimensional airfoil by solving Navier-Stokes equations N86-17292
Analysis of high Reynolds number transonic flow around an airfoil N86-17293
finite element analysis of transient forced convection and conjugate heat transfer N86-17660
Development of a Two-Dimensional/Axisymmetric implicit Navier-Stokes solver using flux-difference splitting concepts and fully general geometry
[AD-A159776] N86-17667
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
An improved pressure iteration procedure for the SOLA algorithm applied to the solution of the incompressible Navier-Stokes equations
[VKI-TM-35] N86-17682
Laminar flow in a driven square cavity
[PDR/CFDU/IC/17] N86-17689
NAVIGATION AIDS
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329
NAVIGATION INSTRUMENTS
Construction of a measuring method using fiber optics and an LTN-90 laser gyro strapdown system for BO-195 helicopters
[DFVLR-MITT-85-10] N86-17333
NEAR INFRARED RADIATION
Learning algorithms in the infrared
[DE85-016441] N86-17507
NEAR ULTRAVIOLET RADIATION
Excimer laser phototherapy for the dissolution of abnormal growth
[DE85-017803] N86-17741
NEODYMIUM LASERS
A study of continuous wave lasing and modelocking in a neodymium-phosphate glass crystal N86-17729
NEON
Neon gas puff Z-pinch implosions on Proto-2
[DE85-017636] N86-18194
NEOPLASMS
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981
NETHERLANDS
The 1984 L-band radar experiment. Part 1: Ground truth Flevo (Netherlands) 1984 --- SIR-B N86-17609
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterschelde (the Netherlands)
[MDLK-R-8509] N86-17722
Activities report on the Technical Highschool Twente (THT) CWD windmill project
[WM-090] N86-17889
Noise assessment around Schiphol airport (the Netherlands) in 1981
[NLR-TR-82034-U] N86-17915

Noise assessment around Rotterdam airport (the Netherlands) in 1981
[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922
Limited surface observations climatic summary LISOCS. Gilze-Rijen, Netherlands
[AD-A159863] N86-17952

NETWORK ANALYSIS
Equivalent-circuit calculations for built-up magnetic structures by projection method N86-17655
A Markovian model, with state-dependent parameters, of a transactional system supported by checkpointing and recovery strategies --- computer networks N86-18110

NETWORK CONTROL
A distributed file service based on optimistic concurrency control
[CWI-CS-R8507] N86-18251

NEUMANN PROBLEM
Difference methods of higher order for elliptic boundary value problems with curved boundaries
[TUM-I8411] N86-18059

NEUTRINOS
Comment on an unusual event in the E594 detector from the direction of Cygnus X-3
[DE85-018341] N86-18278

NEUTRON BEAMS
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
Status of the intense pulsed neutron source
[DE85-018387] N86-18170

NEUTRON COUNTERS
Neutron dosimetry intercomparison at the National Physics Laboratory
[NPL-RS(EXT)-79] N86-18135

NEUTRON CROSS SECTIONS
Difficulties with inferring neutron cross sections from charged-particle reactions
[DE86-000020] N86-18149

NEUTRON DIFFRACTION
Coupled electron-nuclear magnetism and neutron diffraction
[DE85-016479] N86-17539
Disorder and transport in lithium/aluminum
[DE85-018389] N86-18231
Rhombohedral-to-triclinic phase transition in BaMo6S8
[DE85-018450] N86-18232

NEUTRON EMISSION
New delayed neutron precursors measured at TRISTAN
[DE85-017918] N86-18141

NEUTRON IRRADIATION
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548

NEUTRON SCATTERING
Inelastic scattering from amorphous solids
[DE85-018371] N86-18230

NEUTRON SOURCES
Status of the intense pulsed neutron source
[DE85-018387] N86-18170

NEUTRON SPECTRA
NE-213-scintillator-based neutron detection system for diagnostic measurements of energy spectra for neutrons having energies greater than or equal to 0.8 MeV created during plasma operations at the Princeton Tokamak Fusion Test Reactor
[DE85-018079] N86-18198

NEUTRONS
New delayed neutron precursors measured at TRISTAN
[DE85-017918] N86-18141
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148

NICKEL
Metal film deposition by laser breakdown chemical vapor deposition
[DE85-017554] N86-17738
Surface finish measurements of diamond-turned electroless-nickel-plated mirrors
[DE85-017833] N86-18185

NICKEL ALLOYS
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530
Localized electrochemical corrosion of nickel based alloys
[DE86-000521] N86-17545
Heavy metal alloys containing 30% to 90% tungsten
[DE85-017896] N86-17546
Recent developments concerning segregation and fracture at grain boundaries
[DE85-018106] N86-17547
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212

NICKEL CADMIUM BATTERIES
Temperature derivative battery charge control N86-17445
Use of impedance measurements to model nickel-cadmium batteries N86-17446
Improvement of the process for electrochemical impregnation of nickel hydroxide electrodes --- nickel cadmium batteries N86-17447
The results of some end of life tests on the OTS battery N86-17448

NICKEL COMPOUNDS
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513

NICKEL IRON BATTERIES
Research, development, and demonstration of nickel-iron batteries for electric vehicle propulsion
[DE86-000520] N86-17629

NICKEL OXIDES
Improvement of the process for electrochemical impregnation of nickel hydroxide electrodes --- nickel cadmium batteries N86-17447

NICKEL STEELS
Enhancing the impact toughness of low alloy steel by micro-alloying and modification
[BLL-M-36490-(5828.4)] N86-17522
Hyperfine fields in Fe-Ni-X alloys and their application to a study of tempering of 9Ni steel
[DE85-011517] N86-17538

NIGHT VISION
Helicopter cockpit organization for night vision
[SNIAS-852-210-103] N86-17996

NIOBIUM ALLOYS
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220

NITRO COMPOUNDS
Reduction of aliphatic nitrocompounds on nonoxidised and oxidised carbon fibre electrodes
[BR97661] N86-17471

NITROGEN TETROXIDE
The effects of surface pretreatment and nitrogen tetroxide purification on the corrosion rate of Type 304L stainless steel N86-17396

NITROUS OXIDES
Development of low-emission gas turbine combustion systems
[BMFT-FB-T-85-064] N86-17763

NOISE (SOUND)
Uncorrelated noise in turbulence measurements
[PB85-212314] N86-17968

NOISE MEASUREMENT
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Helicopter internal noise treatment. Recent methodolgies and practical applications
[SNIAS-852-210-102] N86-18133

NOISE POLLUTION
Noise assessment around Schiphol airport (the Netherlands) in 1981
[NLR-TR-82034-U] N86-17915
Noise assessment around Rotterdam airport (the Netherlands) in 1981
[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922

NOISE PREDICTION
Analysis of the noise emitted by a tail rotor N86-18129

NOISE PREDICTION (AIRCRAFT)
Separation of airborne and structureborne noise radiated by plates constructed of conventional and composite materials with applications for prediction of interior noise paths in propeller driven aircraft
[NASA-TM-87414] N86-18121

NOISE REDUCTION
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598
Activities report in applied physics N86-18119
Application of active noise reduction for hearing protection and speech intelligibility improvement
[IZF-1985-7] N86-18131
Noise prevention N86-18132
Helicopter internal noise treatment. Recent methodolgies and practical applications
[SNIAS-852-210-102] N86-18133

NOISE SPECTRA
Analysis of the noise emitted by a tail rotor N86-18129

NONDESTRUCTIVE TESTS
Applications of holographic interferometry to nondestructive inspections of composite material structures
[SNIAS-852-430-112] N86-17492
Description of a nondestructive facility using holographic interferometry
[SNIAS-852-430-105] N86-17726
In-process acoustic emission monitoring of laser welds
[DE85-017184] N86-17772
A concept for the quality assurance of ceramic gas turbine components using nondestructive tests
[BMFT-FB-T-85-094] N86-17773
Quadrinomial distribution for the characterization of nondestructive inspection (NDI) reliability
[NLR-MP-84064-U] N86-17774
Reliability of nondestructive inspection
[NLR-TR-84011-U] N86-17775
NDE (Non-Destructive Evaluation) publications, 1982
[PB85-244069] N86-17776
The use of ultrasonic wave attenuation to monitor polymer and composite quality
[AERE-R-11704] N86-17777
Estimation of flaw size in ultrasonic testing of welds in unalloyed and low-alloy steels
[BLL-RISLEY-TR-5229-(9091.9F)] N86-17782

NONLINEAR EVOLUTION EQUATIONS
Nonlinear evolution equations associated with the chiral field spectral problem
[PREPRINT-455] N86-18112

NONLINEAR FILTERS
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
An efficient filter for abruptly changing systems
[NLR-MP-84071-U] N86-18056

NONLINEAR OPTICS
Nonlinear refractive index measurements of isotropic liquid crystals
[AD-A159519] N86-18209

NONLINEAR SYSTEMS
Nonlinear systems: An introduction to describing functions
[ESDU-84009] N86-18058

NONLINEARITY
Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects
[NASA-TM-87207] N86-17789
Aspects of turbulence in nonlinear systems, year one
[DE85-016253] N86-18188
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018082] N86-18189

NONUNIFORM FLOW
Thrust measurements for ramjet performance documentation N86-17401

NORMAL DENSITY FUNCTIONS
Sensitivity, applicability and validation of bi-Gaussian off- and on-line models for the evaluation of the consequences of accidental releases in nuclear facilities --- air pollution
[EUR-9385-EN] N86-17897
Waveform vector quantization: The algebraic approach
[ENST-85C004] N86-18096

NORMALIZING (STATISTICS)
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109

NORMS
Slow motor: ISO round robin tests --- hydraulic motors
[CETIM-N-01270] N86-17587

NORTH CAROLINA
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822

NORWAY
Activities report in space research in Norway
[SAD-125-T] N86-17361

NOTCH TESTS
The effect of blunt notches and saw cuts on the static strength of 2024-T3 and 7075-T6 sheet material --- aluminum alloys
[VTH-LR-313] N86-17807

NOVAE
Infrared observations of novae N86-18272

NOZZLE DESIGN
Low cost carbon/carbon nozzles for solid rocket motors N86-17381
Thrust vector technology demonstration N86-17384
Hot Gas Laboratory twin nozzle calibration
[BAE-ARG-200] N86-17666

NOZZLE FLOW
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
Flows of gas-particle mixtures with size-distribution N86-17274
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282
Thrust vector technology demonstration N86-17384
Hot Gas Laboratory twin nozzle calibration
[BAE-ARG-200] N86-17666

NOZZLE GEOMETRY
Hot Gas Laboratory twin nozzle calibration
[BAE-ARG-200] N86-17666

NOZZLE WALLS
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282

NUCLEAR DEFORMATION
Evolution of nuclear shapes at high spins
[DE85-018074] N86-18142

NUCLEAR ELECTRIC PROPULSION
Systems analysis of solid fuel nuclear engines in cislunar space
[ILR-MITT-142] N86-18171

NUCLEAR EXPLOSION EFFECT
Calculating the vulnerability of synthetic polymers to autoignition during nuclear flash
[DE85-016649] N86-17571

NUCLEAR FUEL ELEMENTS
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019

NUCLEAR FUEL REPROCESSING
Plutonium(4) hydrous polymer chemistry
[DE85-016594] N86-17570

NUCLEAR FUELS
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019

NUCLEAR FUSION
Nuclear astrophysics away from stability
[DE85-018188] N86-18281

NUCLEAR INTERACTIONS
Applications of quantum chromodynamics to hadronic and nuclear interactions
[DE86-000054] N86-18150

NUCLEAR MAGNETIC RESONANCE
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513

NUCLEAR MODELS
Neutrinoless double beta decay and multiquark states in nuclei
[PREPRINT-449] N86-18159

NUCLEAR PHYSICS
Activities report in fundamental research on matter (FOM) N86-18118

NUCLEAR POWER PLANTS
Engineering characterization of ground motion. Task 2: Effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects
[TI85-901169] N86-17796
An approach to the quantification of seismic margins in nuclear power plants
[TI85-017151] N86-17934
A combination of artificial intelligence and procedural language programs in a computer application system supporting nuclear reactor operations
[DE85-007937] N86-18052

NUCLEAR POWER REACTORS
Evaluation of functional experience with safety valves
[BMI-1985-080] N86-17760
A combination of artificial intelligence and procedural language programs in a computer application system supporting nuclear reactor operations
[DE85-007937] N86-18052

NUCLEAR REACTIONS
Compound nucleus studies with reverse kinematics
[DE85-016630] N86-18138
Difficulties with inferring neutron cross sections from charged-particle reactions
[DE86-000020] N86-18149
Applications of quantum chromodynamics to hadronic and nuclear interactions
[DE86-000054] N86-18150

NUCLEAR REACTORS
Parametric study of the amplification factor in the energy balance method
[TI85-010472] N86-18111

NUCLEAR ROCKET ENGINES
Systems analysis of solid fuel nuclear engines in cislunar space
[ILR-MITT-142] N86-18171

NUCLEAR SPIN
Evolution of nuclear shapes at high spins
[DE85-018074] N86-18142
Difficulties with inferring neutron cross sections from charged-particle reactions
[DE86-000020] N86-18149
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152

NUCLEAR STRUCTURE
Compound nucleus studies with reverse kinematics
[DE85-016630] N86-18138

NUCLEI (NUCLEAR PHYSICS)
Compound nucleus studies with reverse kinematics
[DE85-016630] N86-18138
Group representation matrix and scattering from nuclei
[DE85-017527] N86-18139
Evolution of nuclear shapes at high spins
[DE85-018074] N86-18142

NUCLEON-NUCLEON INTERACTIONS
Quark dynamics of N anti N annihilation
[DE85-017508] N86-18153

NUCLEON-NUCLEON SCATTERING
ABC's of pion charge exchange
[DE85-017531] N86-18155

NUCLEONS
Large magnetic spectrometer group
[DE85-017512] N86-18154

NUMBER THEORY
Computation of all the amicable pairs below 10 billion
[CWI-NM-R8503] N86-18087

NUMERICAL ANALYSIS
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
Interface procedures for overlapping grids
[NASA-CR-176460] N86-18061
Power series approximations to the null distributions of some Chi-Bar-Square statistics
[AD-A159785] N86-18101

NUMERICAL CONTROL
Digital structure of an autopiloting for asynchronous machine fed by Pulse Width Modulation (PWM) converter N86-17438

NUMERICAL FLOW VISUALIZATION
Numerical analysis of fully three-dimensional flow in transonic turbine cascades N86-17279

NUMERICAL INTEGRATION
Numerical integration of retarded differential equations with periodic solutions
[CWI-NM-R8502] N86-18086
Discretization of hyperbolic differential equations with periodic solutions
[CWI-NM-R8510] N86-18091

NUMERICAL WEATHER FORECASTING
Limited surface observations climatic summary LISOCS. Gilze-Rijen, Netherlands
[AD-A159863] N86-17952
Installation of automated weather observing systems by FAA (Federal Aviation Administration) at commercial airports is not justified
[PB85-241347] N86-17964
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs
[PB85-248110] N86-17967

O

OBSERVATION
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159802] N86-17950

OCEAN BOTTOM
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123

OCEAN CURRENTS
A program for International Polar Oceans Research (PIPOR)
[ESA-SP-1074] N86-17972

OCEAN DATA ACQUISITIONS SYSTEMS
International list of selected, supplementary and auxiliary ships --- WMO
[WMO-47-ED-85] N86-17971

OCEANOGRAPHIC PARAMETERS
Monthly infrared imagery enhancement curves: A tool for nighttime sea fog identification off the New England Coast
[PB85-237725] N86-17966
A study of ERS-1 radar altimeter data processing requirements
[ESA-CR(P)-2073] N86-18028

OCEANOGRAPHY
Applications and scientific uses of ERS-1 radar altimeter data
[ESA-CR(P)-2084] N86-17823

OCEANS
Bibliography of research on ocean fronts, 1964-1984
[AD-A160040] N86-17970

OFFSHORE PLATFORMS
Numerical simulation of flow around circular cylinders at high Reynolds numbers --- offshore structures
[Z-50551] N86-17697

OKLAHOMA
Water resources data for Oklahoma, water year 1983
[PB85-236289] N86-17834

OLIVINE
Chemically bonded ceramic materials for use in thermal energy storage devices
[DE85-018078] N86-17572

ON-LINE SYSTEMS
Remote and in-situ analysis
[DE85-017397] N86-17515

ONBOARD EQUIPMENT
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329
Space station propulsion approaches and technology status N86-17421

ONE DIMENSIONAL FLOW
One-dimensional prediction of the interface motion separating two immiscible fluids enclosed in a long duct
[PDR/CFDU/IC/19] N86-17690

OPACITY
Total normal emittance measurements of highly conductive, opaque materials using a solar furnace
[DE85-016578] N86-17508
Nanosecond optical shutters
[DE85-017535] N86-18182

OPEN CIRCUIT VOLTAGE
Further research on high open circuit voltage in silicon solar cells N86-17842
Superlattices and multilayer structures for high efficiency solar cells N86-17850

OPERATIONAL AMPLIFIERS
Composite operational amplifiers and their use in improving bandwidth, speed and accuracy in active networks
[AD-A159819] N86-17619

OPERATIONAL HAZARDS
Computer simulation of environmental, hazard scenarios in space N86-17411

OPERATORS (MATHEMATICS)
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100

OPTICAL COMMUNICATION
Report on the joint activities of the Ugo Bordoni Foundation and the Istituto Superiore delle Poste e delle Telecomunicazioni --- communications research N86-17603
OPTICAL DATA PROCESSING
Electro-optical aerial reconnaissance camera: An experimental system used in a simulated reconnaissance environment
[FOA-C-30394-E1] N86-17719
Development of scanner digital image acquisition for photogrammetry
[MBB-UA-876/85] N86-17827
OPTICAL MEASUREMENT
Measurement of thermo-optical properties of thermal control materials
[ESA-PSS-01-709-ISSUE-1] N86-17375
OPTICAL MEASURING INSTRUMENTS
Investigation of the quantum efficiency of optical heterodyne detectors
[NASA-CR-176489] N86-18179
Optical switch
[DE85-017783] N86-18184
OPTICAL PROPERTIES
Rare earth chemical and physical metallurgy
[DE85-015536] N86-17537
OPTICAL PUMPING
Development of solid state vibrational lasers
[AD-A159817] N86-17732
OPTICAL REFLECTION
The Smoke Transmission and Reflection Threshold (START) model; the Oldebroek (Netherlands) 2 trials, May 1981
[IZF-1984-22] N86-18187
OPTICAL RESONANCE
Theoretical studies of Resonance Enhance Stimulated Raman Scattering (RESRS) of frequency doubled Alexandrite laser wavelengths in cesium vapor
[NASA-CR-176464] N86-17731
OPTICAL RESONATORS
Metrological provision for measurement of relative energy density distribution over beam cross section and of beam divergence in pulse lasers N86-17643
OPTICAL TRACKING
Weld seam-tracking with an optical sensor using structured light N86-17764
Design for a path control algorithm of a robot arm with external sensor control N86-18057
OPTICAL TRANSITION
Study of optical transition radiation produced by 30 to 70 MeV energy electrons: Application to the diagnostics of beams with charged particles. Chapter 2: Description of the experimental device. Chapter 6: Experiments with transition radiation interference
[DE86-001258] N86-18158
OPTICAL WAVEGUIDES
Crossing channel waveguide electro-optic modulators N86-18176
OPTIMAL CONTROL
The application of optimal control methods to the deconvolution of velocity meter signals
[ISVR-TR-128] N86-17717
OPTIMIZATION
Optimization in design processes: An informatics point of view
[NLR-MP-84074-U] N86-17349
Compensating structure and parameter optimization for attitude control of a flexible spacecraft
[INPE-3564-PRE/770] N86-17371
Design optimization for a space based, reusable orbit transfer vehicle N86-17418
Performance evaluation of nonlinear optimization methods via pairwise comparison and fuzzy number
[REPT-84-40] N86-18098
ORBIT TRANSFER VEHICLES
IUS propulsion status N86-17415
Orbital transfer vehicle engine integration study N86-17416
Design optimization for a space based, reusable orbit transfer vehicle N86-17418
The effect of engine design characteristics on orbital transfer vehicle performance N86-17419
The O sub 2/H sub 2 propulsion module for planetary spacecraft injection energy augmentation N86-17422
Microwave electric propulsion for orbit transfer applications N86-17429
ORBITAL MANEUVERS
Analysis of electric propulsion concepts for near-term mission application N86-17424
ORBITAL MECHANICS
Space station propulsion approaches and technology status N86-17421
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862
ORBITAL SPACE TESTS
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862
ORGANIC SILICON COMPOUNDS
Ceramic fiber composites: Manufacturing and performances
[SNIAS-852-430-118] N86-17497
ORTHOGONAL MULTIPLEXING THEORY
A model for the analysis of orthogonal modulation methods for digital transmission
[FI-445-TBR-23] N86-17602
OTS (ESA)
The results of some end of life tests on the OTS battery N86-17448
OUTER PLANETS EXPLORERS
Interplanetary exploration-A challenge for photovoltaics N86-17861
OVERPRESSURE
Close-in characteristics of LH2/LOX reactions N86-17410
OXIDATION
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530
OXIDATION RESISTANCE
Oxidation resistant coatings for refractory metals N86-17399
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477
OXIDATION-REDUCTION REACTIONS
The role of solvent reorganization dynamics in electron-transfer processes. Theory-experiment comparisons for electrochemical and homogeneous electron exchange involving metallocene redox couples
[AD-A160034] N86-17504
OXYGEN
Catalytic reactivity of thin crystal surfaces
[DE85-018293] N86-18228
OXYGEN ANALYZERS
Operational considerations in monitoring oxygen levels at the National Transonic Facility
[NASA-CR-3953] N86-17359
OXYGEN SPECTRA
Oxyluminescence study of the degradation of filled and unfilled rubbers
[BR94542] N86-17567
OXYGEN 18
Oxygen-18 study of the atmospheric-aquatic linkage in three Adirondack lake watersheds
[DE85-018355] N86-17912
OZONE
Atmospheric fates of organic chemicals: Prediction of ozone and hydroxyl radical reaction rates and mechanisms
[PB85-241529] N86-17927
Assessment of individual human exposures to ozone in a health study
[PB85-245975] N86-17984

P

P-I-N JUNCTIONS
Improved method of preparing p-i-n junctions in amorphous silicon semiconductors
[DE85-017736] N86-18217
P-N JUNCTIONS
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858
P-TYPE SEMICONDUCTORS
Further research on high open circuit voltage in silicon solar cells N86-17842
PAINTS
Total normal emittance measurements of highly conductive, opaque materials using a solar furnace
[DE85-016578] N86-17508
PAIR PRODUCTION
Indiana University High Energy Physics Group
[DE85-012000] N86-18169
PALLADIUM COMPOUNDS
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
PANEL METHOD (FLUID DYNAMICS)
Development of subsonic computational aerodynamic program using panel method N86-17286
A survey of computational methods for subsonic and transonic aerodynamic design
[NLR-MP-84066-U] N86-17323
PANELS
Design of hat-stiffened composite panels under uniaxial compression and shear. Minimum mass optimization based on a simplified theory
[VTH-LR-312] N86-17806
Residual strength of bonded stiffened panels: Prediction and experimental verification
[NLR-TR-83066-U] N86-17808
PARABOLIC DIFFERENTIAL EQUATIONS
An explicit scheme for the prediction of ocean acoustic propagation in three dimensions
[AD-A160053] N86-18125
PARABOLIC REFLECTORS
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876
PARACHUTE DESCENT
Introduction to deployable recovery systems
[DE86-000048] N86-17310
PARACHUTES
Introduction to deployable recovery systems
[DE86-000048] N86-17310
PARALLEL PROCESSING (COMPUTERS)
Image processor architectures and a data-driven image processore: TIP-1 N86-17287
Partitioning problems in parallel, pipelined and distributed computing
[NASA-CR-178023] N86-17997
Research in computer science
[NASA-CR-176486] N86-17998
PARAMETER IDENTIFICATION
Efficiency calculation for gas turbines: Searching for simple relations between thermodynamic efficiency of a gas turbine and efficiency determining parameters
[SS-44] N86-17766
Development and application of a direct algorithm adapted to the discrete Fourier transform for the determination of the modal parameters of linear vibration systems
[RUB-IFM-MITT-42] N86-17786
Structural and parametric identification of Multiple Input Multiple Output program guide (MIMO) systems according to Guidorzi N86-18038
Structural and parametric identification of Multiple Input Multiple Output (MIMO) sustems according to Guidorzi, program guide N86-18039
Structural and parametric identification of Multiple Input Multiple Output (MIMO) systems according to Guidorzi. Further developments and applications N86-18040
A generalized diagram for various parameter estimation methods; the coherence in pseudo-linear regression schemes
[ER-83/07] N86-18095
PARAMETERIZATION
A Markovian model, with state-dependent parameters, of a transactional system supported by checkpointing and recovery strategies --- computer networks N86-18110
PARTIAL DIFFERENTIAL EQUATIONS
Numerical grid generation using algebraic and geometrical techniques N86-17288
Interface procedures for overlapping grids
[NASA-CR-176460] N86-18061
Dirichlet problem for Lipschitz domain. The setup N86-18063
PARTIAL PRESSURE
Operational considerations in monitoring oxygen levels at the National Transonic Facility
[NASA-CR-3953] N86-17359
Method for sensing and measuring a concentration or partial pressure of a reactant used in a redox reaction
[DE85-017740] N86-17630
PARTICLE ACCELERATOR TARGETS
Basic aspects of ion beam mixing
[DE85-018391] N86-18145
Study of optical transition radiation produced by 30 to 70 MeV energy electrons: Application to the diagnostics of beams with charged particles. Chapter 2: Description of the experimental device. Chapter 6: Experiments with transition radiation interference
[DE86-001258] N86-18158
PARTICLE ACCELERATORS
Status of the intense pulsed neutron source
[DE85-018387] N86-18170
PARTICLE COLLISIONS
Resonance production in gamma gamma collisions 2
[NIKHEF-H/85-2] N86-17890
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137
Recent results of the study of photon-photon collisions
[DE85-018110] N86-18140
Large magnetic spectrometer group
[DE85-017512] N86-18154
Large-t elastic scattering and diffraction dissociation
[NIKHEF-H/85-4] N86-18163
PARTICLE DIFFUSION
Models and prediction of turbulent flow with particles
[ONERA-RTS-21/7135-EY] N86-17692

PARTICLE EMISSION
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137
Compound nucleus studies with reverse kinematics
[DE85-016630] N86-18138
PARTICLE INTERACTIONS
New results on Bhabha scattering at 29 GV
[DE85-018408] N86-18146
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
PARTICLE MASS
Commutator of the quark mass matrices in the standard electroweak model and a measure of maximal CP-violation
[USIP-85-14] N86-18173
PARTICLE PRODUCTION
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
Large magnetic spectrometer group
[DE85-017512] N86-18154
PARTICLE SIZE DISTRIBUTION
Flows of gas-particle mixtures with size-distribution N86-17274
The numerical calculation of particle-size distributions in 2D jets and boundary layers
[CFD/85/6] N86-17688
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115
PARTICLE THEORY
Indiana University High Energy Physics Group
[DE85-012000] N86-18169
PARTICLE TRACKS
Large magnetic spectrometer group
[DE85-017512] N86-18154
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
PARTICLE TRAJECTORIES
Rocket motor slag formation. Effects of internal flow field and propellant grain configuration N86-17414
PARTICLES
Fluidizing device for solid particulates
[DE85-006504] N86-17752
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115
PAYLOAD DELIVERY (STS)
PASP: A high voltage array experiment N86-17863
PAYLOAD RETRIEVAL (STS)
Results of space shuttle flight 51-A
[GPO-44-770] N86-17367
PAYLOADS
Introduction to deployable recovery systems
[DE86-000048] N86-17310
Improved space motor demonstration N86-17413
PEAKS
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220
PEELING
Use of peel values in structural analysis N86-17394
PENNSYLVANIA
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837
PERFORMANCE PREDICTION
Cracked ballistic grain tests and analysis N86-17383
PERFORMANCE TESTS
The application of sensors in light tests
[NLR-MP-84056-U] N86-17352
Factors affecting Pi sub k in HTPB formulations N86-17390
LOX/LH2 vane pump for auxiliary propulsion systems N86-17397
Operational tests of the BNL 24.8 kW, 3.8 K helium refrigerator
[DE85-017851] N86-17584
Research, development, and demonstration of nickel-iron batteries for electric vehicle propulsion
[DE86-000520] N86-17629
Heat image generators: State of affairs by the exploration of some possibilities
[IZF-1985-15] N86-17723
High pressure gas storage tanks: A compromise between safety regulations and performances
[SNIAS-852-430-115] N86-17768
Test and operation program STEP 100 (German-Australian solar power plant in Meekatharra, Western Australia)
[BMFT-FB-T-85-077] N86-17887
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport
[REPT-1] N86-17985
Performance comparison of thirty, two-stage demand regulators --- underwater breathing apparatus
[ARE(M6)-TM-83818] N86-17987
Test of Applicon Bravo
[A-13] N86-18007
Test of Intergraph
[A-11] N86-18047
Test of Superdraft
[A-12] N86-18048
PERIODIC FUNCTIONS
An introductory comparative study of the Hopf bifurcation method and the Dee harmonic balance method
[LAB-REPT-757] N86-18113
PERIODIC VARIATIONS
Stability, multiplicity and global continuation of symmetric periodic solutions of a nonlinear Volterra integral equation
[CWI-AM-R8502] N86-18078
Numerical integration of retarded differential equations with periodic solutions
[CWI-NM-R8502] N86-18086
Discretization of hyperbolic differential equations with periodic solutions
[CWI-NM-R8510] N86-18091
Solar 160 min oscillation at microwave N86-18261
Correlated variability in the W49N water maser source N86-18264
PERIPHERAL EQUIPMENT (COMPUTERS)
The use of vector computers in aerodynamic computations
[NLR-MP-84051-U] N86-18031
PERMALLOYS (TRADEMARK)
Designing high frequency ac inductors using ferrite and Molypermalloy Powder Cores (MPP) N86-17452
PERSONNEL MANAGEMENT
Personnel activities report in aerospace research N86-18243
PERTURBATION
Upsetting of viscoplastic medium between two rigid plates in presence of friction
[BLL-M-36390-(5828.4)] N86-17745
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123
PERTURBATION THEORY
An outline of the practical use of Lie series
[ESA-STR-215] N86-18082
Applications of quantum chromodynamics to hadronic and nuclear interactions
[DE86-000054] N86-18150
PERU
Tsunamis in Peru-Chile
[PB85-247815] N86-17973
PHASE CHANGE MATERIALS
Mathematical model for the distribution of the long-term efficiency of phase-change materials and its application in heat-storage
[DE85-016451] N86-17873
Composite materials for thermal energy storage
[DE85-017743] N86-17881
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
PHASE ERROR
Explicit Runge-Kutta (-Nystroem) methods with reduced phase errors for computing oscillating solutions
[CWI-NM-R8504] N86-18088
PHASE SHIFT KEYING
A model for the analysis of orthogonal modulation methods for digital transmission
[FI-445-TBR-23] N86-17602
PHASE TRANSFORMATIONS
First order phase transformations: Scaling relations for grain self-correlation functions
[DE85-017509] N86-18213
Tricritical behavior in the ferromagnetic superconductor ErRh4B4
[DE85-018339] N86-18229
Rhombohedral-to-triclinic phase transition in BaMo6S8
[DE85-018450] N86-18232
PHOSPHINES
Observations of the J = 10 manifold of the pure rotational band of phosphine on Saturn
[NASA-TM-86851] N86-18277
PHOSPHORESCENCE
Oxyluminescence study of the degradation of filled and unfilled rubbers
[BR94542] N86-17567
PHOTOCONDUCTORS
Ultra-fast photoconductive switches
[RSRE-MEMO-3784] N86-18208
PHOTODECOMPOSITION
Photodecomposition of Mo(CO)6 adsorbed on Si(100)
[DE85-017818] N86-17510
PHOTOELECTRIC EMISSION
Polar fluids: Photoemission and electronic energy levels
[DE85-016974] N86-18227
PHOTOELECTRIC GENERATORS
Interplanetary exploration-A challenge for photovoltaics N86-17861
PHOTOELECTROCHEMICAL DEVICES
Investigation of electrochemical corrosion of semiconductors
[DE85-016853] N86-17541
Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625
PHOTOGRAMMETRY
Development of scanner digital image acquisition for photogrammetry
[MBB-UA-876/85] N86-17827
PHOTOGRAPHS
Visualization of interior ballistic phenomena
[SNPE-NT-27/85/CRB/NP] N86-17580
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
Photosimulation of target acquisition in the presence of smoke: A pilot study
[IZF-1984-36] N86-17986
PHOTOIONIZATION
Lithium soft X-ray laser N86-17730
PHOTOLYSIS
Photodecomposition of Mo(CO)6 adsorbed on Si(100)
[DE85-017818] N86-17510
Ultraviolet laser-induced photocondensation in the benzol vapor phase
[MPIS-4/1985] N86-17520
PHOTOMETERS
Investigation of the quantum efficiency of optical heterodyne detectors
[NASA-CR-176489] N86-18179
PHOTOMETRY
Optical and infrared photometry of southern early-type shell stars and pre-main-sequence variables N86-18274
PHOTON BEAMS
High flux photon beam monitor
[DE85-018202] N86-17714
PHOTONS
Lithium soft X-ray laser N86-17730
Resonance production in gamma gamma collisions 2
[NIKHEF-H/85-2] N86-17890
Recent results of the study of photon-photon collisions
[DE85-018110] N86-18140
PHOTOOXIDATION
Oxyluminescence study of the degradation of filled and unfilled rubbers
[BR94542] N86-17567
PHOTORECONNAISSANCE
Electro-optical aerial reconnaissance camera: An experimental system used in a simulated reconnaissance environment
[FOA-C-30394-E1] N86-17719
PHOTOSYNTHESIS
Method for improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system
[DE85-017723] N86-17978
PHOTOTRANSISTORS
Integrated optoelectronic circuits and their modular designs for residue number computation N86-17614
PHOTOVOLTAIC CELLS
Photovoltaic array simulation N86-17449
Space Photovoltaic Research and Technology 1985: High Efficiency, Space Environment, and Array Technology
[NASA-CP-2408] N86-17839
Future Air Force space power needs N86-17840
Overview of SERI's high efficiency solar cell research N86-17841
Superlattices and multilayer structures for high efficiency solar cells N86-17850
Photon radiation effects on CdS/CuInSe2 thin film solar cells N86-17857

Interplanetary exploration-A challenge for photovoltaics N86-17861
Array technology and applications N86-17872

PHOTOVOLTAIC EFFECT
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854

PHYSICAL CHEMISTRY
Physical chemical characterization tests of the 5245C NARMCO preimpregnation resin, test report M3-449000, part 1 — carbon fiber impregnation [PV-M3-449000-PT-1] N86-17490

PHYSIOCHEMISTRY
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds [DE85-017094] N86-17505
Physiochemical transformation of radioactive nuclei in water environments [CISE-2694] N86-17914

PHYSIOLOGICAL EFFECTS
Assessment of individual human exposures to ozone in a health study [PB85-245975] N86-17984

PICOSECOND PULSES
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728

PIEZOELECTRIC CRYSTALS
Development of a piezoelectric quartz pressure sensor for avionics with excellent long term stability (with final demonstration of the results on a prototype) [BMFT-FB-W-85-010] N86-17353

PIEZOELECTRICITY
UHV piezoelectric translator [DE85-018201] N86-17627

PILOT PERFORMANCE
The biomorphic model of the human pilot [VTH-LR-310] N86-17991

PILOT TRAINING
Plan for evaluation of the training potential of helmet-mounted display and computer-generated synthetic imagery [AD-A160299] N86-17705

PILOTS (PERSONNEL)
A comparison of postmortem coronary atherosclerosis findings in general aviation pilot fatalities [AD-A159811] N86-17982

PINCH EFFECT
Neon gas puff Z-pinch implosions on Proto-2 [DE85-017636] N86-18194

PIONS
Position sensitive gas counter readout system [DE85-017953] N86-17713
ABC's of pion charge exchange [DE85-017531] N86-18155

PIPE FLOW
Fluid transients in pipes. Reduction and control of pressure surges in liquids [ESDU-84013] N86-17663

PIPELINING (COMPUTERS)
Functional built-in-test in a pipeline image processor — satellite imagery [NLR-MP-84020-U] N86-17379
Partitioning problems in parallel, pipelined and distributed computing [NASA-CR-178023] N86-17997

PIPES (TUBES)
Free vibrations of finite flexible shells and tubes in axial flow N86-17804
Parametric study of the amplification factor in the energy balance method [TI85-010472] N86-18111

PISTON ENGINES
Fault analysis in dynamic systems with application to reciprocating combustion engines N86-17746
Breadboard development of a hydraulically coupled free piston engine heat pump compressor [DE85-005242] N86-17874

PITTING
Localized electrochemical corrosion of nickel based alloys [DE86-000521] N86-17545
Influence of corrosion pits and environmental moisture on the fatigue behavior of 35 NCD 16 THR-ESR [M3-450900] N86-17555
Study of the influence of pitting corrosion on the fatigue characteristics of Marvac 18 [M2-666500] N86-17556

PLANE WAVES
Wave propagation in thick damped laminated plates [AASU-344] N86-17787

PLANETARY EVOLUTION
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 2: Lithospheric structure, seismicity, and contemporary deformation of the United States Cordillera [NASA-CR-176499] N86-17929

PLANETARY RADIATION
Determination of spectral distributions and instrumental magnitudes of planets [ESA-STR-214] N86-18280

PLASMA CLOUDS
Generation of magnetic field aligned currents, parallel electric fields, and inverted-V structures by plasma pressure inhomogeneities in the magnetosphere [KGI-PREPRINT-073] N86-17941

PLASMA CONTROL
Analysis of the unbalanced NBI rotation experiments in the ISX-B, PLT and PDX Tokamaks [DE85-017616] N86-18193
Experimental studies of radio frequency waves and confinement in the Auburn Torsatron [DE85-017189] N86-18199

PLASMA CURRENTS
Measurement of Faraday rotation in twisted optical fiber using rotating polarization and analog phase detection [DE85-015704] N86-17737
Generation of magnetic field aligned currents, parallel electric fields, and inverted-V structures by plasma pressure inhomogeneities in the magnetosphere [KGI-PREPRINT-073] N86-17941

PLASMA DENSITY
Simultaneous measurement of current and plasma density profiles in the TEXT Tokamak [DE85-017679] N86-18200

PLASMA DIAGNOSTICS
Laser spectroscopy of sputtered atoms [DE85-018388] N86-17517
Maryland controlled fusion research program. Volume 1 [DE85-018027] N86-18197
NE-213-scintillator-based neutron detection system for diagnostic measurements of energy spectra for neutrons having energies greater than or equal to 0.8 MeV created during plasma operations at the Princeton Tokamak Fusion Test Reactor [DE85-018079] N86-18198

PLASMA ENGINES
Analysis of electric propulsion concepts for near-term mission application N86-17424

PLASMA EQUILIBRIUM
Axisymmetric tandem mirror stabilized by a magnetic limiter [DE85-017349] N86-18192

PLASMA FREQUENCIES
Waves with harmonic structure below and above the Lower Hybrid Resonance (LHR) observed on the Cleft Energetics Transport and Ultraviolet Radiation (CENTAUR) 35.001 and 35.002 rockets [DRI-2-85] N86-17946

PLASMA PHYSICS
Activities report in fundamental research on matter (FOM) N86-18118
Maryland controlled fusion research program. Volume 1 [DE85-018027] N86-18197
Activities report in geophysics [UIO-SR-85-01] N86-18203
A difference procedure to solve quasilinear plasma physics parabolic systems [PREPRINT-892] N86-18204

PLASMA PROBES
The hot plasma spectrometers on Viking [KGI-PREPRINT-077] N86-17377

PLASMA RADIATION
Space Environment Workshop N86-17871
Amorphous silicon solar cells, phase 2 [BMFT-FB-T-85-084] N86-17891

PLASMA RESONANCE
Waves with harmonic structure below and above the Lower Hybrid Resonance (LHR) observed on the Cleft Energetics Transport and Ultraviolet Radiation (CENTAUR) 35.001 and 35.002 rockets [DRI-2-85] N86-17946

PLASMA SPRAYING
Development of a manufacturing procedure to produce cold rolling cylinders by deposing a high alloy steel layer on a normal steel cylinder [REPT-1645] N86-17586

PLASMAS (PHYSICS)
Modification of vulcanized elastomer surfaces to diminish adherence to metals [CETIM-100340] N86-17575
Aspects of turbulence in nonlinear systems, year one [DE85-016253] N86-18188

PLASMONS
The interaction between electric dipoles and waveguiding surfaces at optical frequencies N86-18178

PLASTIC DEFORMATION
Development of cobalt-free high grade permanent magnets on the basis of MnAl alloys [BMFT-FB-T-85-099] N86-17559
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
A double-curved triangular shell element allowing the analysis of shell problems in the plastic domain [LAB-REPT-761] N86-17811
Assembling with use of permanent deformation [CETIM-13-N-283] N86-17812

PLASTIC PROPERTIES
International Symposium on Mechanical Properties of Special Concrete [PB85-234961] N86-17770

PLASTICIZERS
Dose of PES (plasticizer) in a BSL914 resin using different standards — liquid chromatography [CEAT-NT-15/M/85] N86-17521

PLASTICS
Study on the measuring of polymer rheological properties by adapting an injection molding machine [CETIM-5-650-06] N86-17574
Robotic deburring: A bibliography [DE85-015760] N86-17750

PLATES (STRUCTURAL MEMBERS)
Fatigue in a welded join made by pulsed MIG welding of a 304 type stainless steel [BLL-RISLEY-TR-5233-(9091.9F)] N86-17783
Static and fatigue strength of explosion welded plates [BLL-RISLEY-TR-5232-(9091.9F)] N86-17784
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate [TI85-016420] N86-17795

PLATES (TECTONICS)
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 3: Kinematics of Great Basin intraplate extension from earthquake, geodetic and geologic information [NASA-CR-176500] N86-17930

PLATINUM
On recovery of platinum from spent catalysts [CE-TRANS-8042] N86-17499

PLATINUM ALLOYS
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426

PLATINUM COMPOUNDS
Chemistry of carbonyl sulfide [DE85-018430] N86-17513

PLOTTERS
GRAPS: Graphical Plotting System [AD-A159808] N86-17821

PLUMES
Development of computational fluid dynamics at NASA Ames Research Center N86-17275

PLUTONIUM
Plutonium(4) hydrous polymer chemistry [DE85-016594] N86-17570

POINT SOURCES
Influence of a large sulfur dioxide point source on mesoscale rainwater chemistry [DE85-018215] N86-17908

POINT TO POINT COMMUNICATION
Local network interconnection through a satellite point to multipoint link [ENST-85E007] N86-17369

POISSON EQUATION
Uncorrelated noise in turbulence measurements [PB85-212314] N86-17968

POLAR CUSPS
Solar wind control of the polar cusp [DMI-GEOPHYS-PAPERS-B-72] N86-18283

POLAR REGIONS
Research on propagation of decimetric radiowaves at high latitudes N86-17641
Boundary layer plasmas as a source for high-latitude, early afternoon, auroral arcs [KGI-PREPRINT-079] N86-17943
A program for International Polar Oceans Research (PIPOR) [ESA-SP-1074] N86-17972

POLARIZATION (CHARGE SEPARATION)
The nature of charge carriers in electrorheological suspensions [BR97662] N86-17500

POLARIZATION (WAVES)
Measurement of Faraday rotation in twisted optical fiber using rotating polarization and analog phase detection [DE85-015704] N86-17737

POLICIES
Regulatory aspects of commercial, space transportation N86-17409

POLISHING
Machine imparting complex rotary motion for lapping a spherical inner diameter [DE85-017790] N86-17754

POLLUTION MONITORING
Characterization and mitigation of organic vapors [DE85-016410] N86-17906

Measuring the electric field in the atmosphere in connection with investigations on the dispersion of air pollution
[S/T-REPT-VOL-2-NO-10] N86-17924

POLLUTION TRANSPORT
Pollutant dispersal --- air pollution, conference
[VKI-LS-1985-02] N86-17895
Numerical techniques and dispersion modeling --- air pollution N86-17898
Fluid modeling of flow and dispersion in the atmosphere: Facilities and techniques --- air pollution N86-17902
Application of linked three-dimensional Planetary Boundary Layer (PBL) and dispersion models to New York City --- air pollution N86-17904
Atmospheric dispersion models and their limitations
[TI85-018522] N86-17905
Influence of a large sulfur dioxide point source on mesoscale rainwater chemistry
[DE85-018215] N86-17908

POLYCRYSTALS
Development of sensors on the basis of polycrystalline silicon
[BMFT-FB-T-85-068] N86-17720
Overview of SERI's high efficiency solar cell research N86-17841

POLYESTER RESINS
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites
[OUEL-1578/85] N86-17480

POLYETHYLENES
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
Chemical characterization of polyethylene resins and polyethylene gas pipe
[DE85-018346] N86-17573

POLYIMIDE RESINS
Elementary characterization of the Rigidite 5245C/IM6 preimpregnated carbon from NARMCO U.S., test report M3-449000, part 2
[PV-M3-449000-PT-2] N86-17489

POLYMER CHEMISTRY
Plutonium(4) hydrous polymer chemistry
[DE85-016594] N86-17570

POLYMERIZATION
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568
Plutonium(4) hydrous polymer chemistry
[DE85-016594] N86-17570

POLYMERS
The use of ultrasonic wave attenuation to monitor polymer and composite quality
[AERE-R-11704] N86-17777

POLYNOMIALS
Quadrinomial distribution for the characterization of nondestructive inspection (NDI) reliability
[NLR-MP-84064-U] N86-17774
Geometric correction of remote sensing images by means of ground control points
[MDLK-R-8429] N86-17826

POLYURETHANE RESINS
Flexible intermediate film with a large temperature range for aeronautical utilization --- windshields N86-17339

POPULATION THEORY
Exponential bound for error probability in NN-Discrimination
[AD-A160305] N86-18067

PORPHYRINS
Inverse Faraday effect in hemoglobin detected by Raman spectroscopy: An example of magnetic resonance Raman activity
[AD-A159806] N86-17975
Method for improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system
[DE85-017723] N86-17978

POSITION (LOCATION)
High flux photon beam monitor
[DE85-018202] N86-17714
The GRAL graphic system for situational maps
[FOA-C-50007-H2] N86-17824

POSITION INDICATORS
High flux photon beam monitor
[DE85-018202] N86-17714

POSITIONING
Programmable high power beam damper for the Tevatron
[DE85-017441] N86-18167

POSITRONS
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137
New results on Bhabha scattering at 29 GV
[DE85-018408] N86-18146

POTASSIUM
Investigations of the interaction between Na(3P) and K(4S) using measurements of the differential scattering cross section
[MPIS-7/1985] N86-18162

POTASSIUM HYDROXIDES
Influence of catalytic additions on ferric-oxide reduction
[BLL-BISI-23009-(9022.060)] N86-17526

POTASSIUM NITRATES
Structure of high-pressure KNO3-4
[DE85-018361] N86-18222

POTENTIAL FLOW
Development of subsonic computational aerodynamic program using panel method N86-17286
Response of viscoelastic slab to viscous slab to viscous fluid flow N86-17657
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699
Boundary layer calculations on the leeward surface of a slender delta wing at incidence
[NLR-TR-84001-U] N86-17700

POTENTIAL THEORY
Subsonic unsteady aeroelasticity: The potential method applied to lifting surfaces
[ONERA-RT-21/3064-RY-045-R] N86-17315

POTENTIOMETERS (INSTRUMENTS)
Surface potential monitor --- spacecraft surfaces
[SEP-TS/SE/RE/10418/84] N86-17378

POWDER METALLURGY
Powder metallurgy: Technology and equipment
[BLL-M-36380-(5828.4)] N86-17524
The mechanical property data base from a cooperative program on first generation PM (Powder Metallurgy) aluminums
[AD-A159779] N86-17534

POWER AMPLIFIERS
The 230W Traveling Wave Tube Amplifier (TWTA) power supply design --- Olympus television satellite N86-17453
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder --- Olympus television satellite N86-17454

POWER CONDITIONING
The 230W Traveling Wave Tube Amplifier (TWTA) power supply design --- Olympus television satellite N86-17453
Application of current-control modulator (MC2) control feedback for 12 GHz 20 W Electric Power Conditioner (EPC) for Telecom satellite N86-17455

POWER CONVERTERS
Modeling and implementation of a digitally controlled power converter using duty ratio quantization --- spacecraft power supplies N86-17461
Study of a resonant converter using power transistors in a 25 kW X-ray tube power supply N86-17466

POWER EFFICIENCY
MATPWR: A mission analysis tool for LEO spacecraft power profiles computation N86-17469
Gas turbines in cogeneration: Overall analysis and numerical predictions N86-17758
A rational efficiency analysis of comparisons and trends in gas turbines for cogeneration N86-17759
Space station power management and distribution N86-17869

POWER MODULES (STS)
Array technology and applications N86-17872

POWER SERIES
Power series approximations to the null distributions of some Chi-Bar-Square statistics
[AD-A159785] N86-18101

POWER SPECTRA
The power spectral density of the HDB2 and the HDB3 coded signals
[FI-44-TBR-96] N86-17608

PRECIPITATION (CHEMISTRY)
Spectral analysis and metallographic investigations of corrosion and precipitation products of high temperature alloys
[JUEL-1975] N86-17553

PRECIPITATION (METEOROLOGY)
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951
Revised Uniform Summary of Surface Weather Observations, Sparrevohn AFS, Alaska
[AD-A159864] N86-17953

PRECISION
Precision cryogenic temperature data acquisition system
[DE85-017847] N86-17712
The indexing properties of an ancillary statistic
[AD-A160030] N86-18105

PREDICTION ANALYSIS TECHNIQUES
Fluid transients in pipes. Reduction and control of pressure surges in liquids
[ESDU-84013] N86-17663
Gas turbines in cogeneration: Overall analysis and numerical predictions N86-17758
A rational efficiency analysis of comparisons and trends in gas turbines for cogeneration N86-17759
Predicting windspeed: A system theoretical approach
[REPT-49] N86-17961
Generalized predictive control. Part 2: Extensions and interpretations
[OUEL-1557/84-PT-2] N86-18054
Predictor-corrector methods for periodic second-order initial value problems
[CWI-NM-R8509] N86-18090

PREDICTIONS
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918

PREIMPREGNATION
Physical chemical tests and feasibility study of the Ciba-Geigy R6376 IM6 prepreg --- fiber reinforced composites
[DGT-26.749] N86-17484

PREPREGS
Physical chemical tests and feasibility study of the Ciba-Geigy R6376 IM6 prepreg --- fiber reinforced composites
[DGT-26.749] N86-17484
Evaluation of the Ciba-Geigy R6376 IM6 prepreg --- fiber reinforced plastics
[DGT-26.649] N86-17485
Elementary characterization of the Rigidite 5245C/IM6 preimpregnated carbon from NARMCO U.S., test report M3-449000, part 2
[PV-M3-449000-PT-2] N86-17489
Physical chemical characterization tests of the 5245C NARMCO preimpregnation resin, test report M3-449000, part 1 --- carbon fiber impregnation
[PV-M3-449000-PT-1] N86-17490

PRESSURE DEPENDENCE
First order phase transformations: Scaling relations for grain self-correlation functions
[DE85-017509] N86-18213

PRESSURE DISTRIBUTION
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282
Inverse method with geometry constraints for transonic airfoil design
[NLR-MP-84069-U] N86-17311

PRESSURE MEASUREMENT
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282
Thrust measurements for ramjet performance documentation N86-17401

PRESSURE OSCILLATIONS
Large-scale, coherent structures as drivers of ramjet combustion instabilities N86-17400

PRESSURE PULSES
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128

PRESSURE REDUCTION
Fluid transients in pipes. Reduction and control of pressure surges in liquids
[ESDU-84013] N86-17663
Low-fin staggered tube banks: Heat transfer and pressure-loss for turbulent single-phase crossflow
[ESDU-84016] N86-17664

PRESSURE REGULATORS
Fluid transients in pipes. Reduction and control of pressure surges in liquids
[ESDU-84013] N86-17663
A waterproof vent valve for immersion suits
[REPT-515] N86-17988

PRESSURE SENSORS
Development of a piezoelectric quartz pressure sensor for avionics with excellent long term stability (with final demonstration of the results on a prototype)
[BMFT-FB-W-85-010] N86-17353

PRESSURE VESSELS
Report on Kevlar -49 composite pressure vessel safety technology program N86-17412
Condensation of the underside of a horizontal surface in a closed vessel
[DE85-018379] N86-17674

High pressure gas storage tanks: A compromise between safety regulations and performances [SNIAS-852-430-115] N86-17768

PRESSURIZED WATER REACTORS

Test of a measuring instrument composed of two local flow turbines, two drag bodies, a full flow turbine and a two-beam densitometer, of the Large Pressurized Water Reactor Offnormal Behavior Investigation (LOBI) instrumentation in a transient two-phase flow [KFK-3877] N86-17694

PRESTRESSING

Fatigue performance of prestressed composite pressure vessels [SNIAS-852-430-114] N86-17494

High pressure gas storage tanks: A compromise between safety regulations and performances [SNIAS-852-430-115] N86-17768

Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects [NASA-TM-87207] N86-17789

PREVENTION

Noise prevention N86-18132

PRINTERS (DATA PROCESSING)

The VIDEDP manual [FOA-C-10212-M4] N86-18041

PROBABILITY DISTRIBUTION FUNCTIONS

Quadrinomial distribution for the characterization of nondestructive inspection (NDI) reliability [NLR-MP-84064-U] N86-17774

Differential metrics in probability spaces based on entropy and divergence measures [AD-A160301] N86-18066

Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device [DE85-018139] N86-18190

PROBABILITY THEORY

Calculating radar detection probabilities by contour integration N86-17590

Reliability of nondestructive inspection [NLR-TR-84011-U] N86-17775

An approach to the quantification of seismic margins in nuclear power plants [TI85-017151] N86-17934

Probabilistic analysis of fault trees using pivotal decomposition [AD-A159856] N86-18012

Differential metrics in probability spaces based on entropy and divergence measures [AD-A160301] N86-18066

Exponential bound for error probability in NN-Discrimination [AD-A160305] N86-18067

On the prediction and the spectral factorization of stationary processes in the broad sense with two discrete parameters [ENST-85C002] N86-18074

PROBLEM SOLVING

Partitioning problems in parallel, pipelined and distributed computing [NASA-CR-178023] N86-17997

A study of the back-and-forth shooting method --- boundary value problems [REPT-A-3] N86-18073

An outline of the practical use of Lie series [ESA-STR-215] N86-18082

An introductory comparative study of the Hopf bifurcation method and the Dee harmonic balance method [LAB-REPT-757] N86-18113

PROCEDURES

Influence of the present practice of heat straightening of thick steel plates (over 20 mm) on the mechanical properties [CETIM-100-840] N86-17560

Assembling with use of permanent deformation [CETIM-13-N-283] N86-17812

PROCESS CONTROL (INDUSTRY)

In-process acoustic emission monitoring of laser welds [DE85-017184] N86-17772

Laser-assisted solar cell metallization processing [NASA-CR-176457] N86-17883

PROCESSES

Process for selectively patterning epitaxial film growth on a semiconductor substrate [DE85-017733] N86-18216

PROCUREMENT POLICY

The ESA preferred parts list [ESA-PSS-01-603] N86-17634

PRODUCT DEVELOPMENT

Development of sensors on the basis of polycrystalline silicon [BMFT-FB-T-85-068] N86-17720

Development of low-emission gas turbine combustion systems [BMFT-FB-T-85-064] N86-17763

The CWD 4000 project (formerly THT-1) --- windmill [WM-075] N86-17888

PRODUCTION ENGINEERING

Activities report of the Department of Engineering N86-18255

PROFILOMETERS

Query language for the Profiler data system [PB85-240190] N86-17965

PROGRAM VERIFICATION (COMPUTERS)

A new approach to the design and construction of protocol testers --- X25 protocol [NPL-DITC-54/85] N86-18006

Validation of a software package for communication systems analysis and design: The TOPSIM 3 software [ESA-CR(P)-2075] N86-18029

The efficiency of the Equation Interpreter compared with the University of New Hampshire (UNH) Prolog interpreter [CWI-CS-R8509] N86-18035

Overview of a test suite for the ISO network convergence protocol over X.25 (1980) [NPL-DITC-59/85] N86-18046

PROGRAMMING LANGUAGES

Query language for the Profiler data system [PB85-240190] N86-17965

The RAND-ABEL programming language: History, rationale, and design [AD-A159821] N86-18010

Algebraic definition of a simple programming language [CWI-CS-R8504] N86-18033

Transition systems, infinitary languages and the semantics of uniform concurrency [CWI-CS-R8506] N86-18034

Infinite streams and finite observations in the semantics of uniform concurrency (preliminary version) [CWI-CS-R8508] N86-18036

PROJECT MANAGEMENT

X-ray satellite [NASA-TM-77997] N86-17370

PROJECTIVE GEOMETRY

Point-line characterizations of buildings [CWI-PM-R8415] N86-18076

An automatic proof procedure for several geometries (report 1) [REPT-84-42] N86-18099

PROPELLANT CHEMISTRY

The effect of engine design characteristics on orbital transfer vehicle performance N86-17419

PROPELLANT COMBUSTION

Bouyant flow and its effect on internal insulation performance: Numerical approach N86-17388

Factors affecting Pi sub k in HTPB formulations N86-17390

Analysis of a gas generator system N86-17391

PROPELLANT DECOMPOSITION

Explosive decomposition of hydrazine due to rapid gas compression N86-17430

PROPELLANT GRAINS

Moonburner: An ultra-high web fraction grain design N86-17392

Rocket motor slag formation. Effects of internal flow field and propellant grain configuration N86-17414

PROPELLANT TESTS

Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426

PROPELLER DRIVE

Environment-friendly propeller aircraft with a maximum weight of 5700 kg, and motor gliders: Publication of the noise values N86-17341

PROPORTIONAL COUNTERS

Gated strip proportional detector [DE85-017757] N86-17708

PROPULSION SYSTEM CONFIGURATIONS

Orbital transfer vehicle engine integration study N86-17416

The effect of engine design characteristics on orbital transfer vehicle performance N86-17419

Space station advanced propulsion and fluid management program N86-17420

Space station propulsion approaches and technology status N86-17421

The O sub 2/H sub 2 propulsion module for planetary spacecraft injection energy augmentation N86-17422

Solar thermal rocket design and fabrication N86-17428

Flight experience with an integrated bipropellant propulsion system: INSAT 1 N86-17431

PROPULSION SYSTEM PERFORMANCE

Orbital transfer vehicle engine integration study N86-17416

Space station advanced propulsion and fluid management program N86-17420

Flight experience with an integrated bipropellant propulsion system: INSAT 1 N86-17431

PROTECTIVE COATINGS

Oxidation resistant coatings for refractory metals N86-17399

Determination of the susceptibility of silver-plated copper wire/cable to red plague corrosion [ESA-PSS-01-720-ISSUE-1] N86-17554

PROTEINS

Protein mapping and the problem of complexity in molecular biology [DE85-018349] N86-17979

PROTOCOL (COMPUTERS)

Local network interconnection through a satellite point to multipoint link [ENST-85E007] N86-17369

A new approach to the design and construction of protocol testers --- X25 protocol [NPL-DITC-54/85] N86-18006

The scenario test driver for the ISO network convergence protocol over X.25 (1980) [NPL-DITC-55/85] N86-18044

Implementation assessment of the OSI network service. The test responder specification --- Open Systems interconnection (OSI) [NPL-DITC-58/85] N86-18045

Overview of a test suite for the ISO network convergence protocol over X.25 (1980) [NPL-DITC-59/85] N86-18046

PROTON BEAMS

The NA27 trigger --- proton beam bubble chamber experiment (NA27) [USIP-85-10] N86-18172

PROTON DAMAGE

Burst annealing of electron damage in silicon solar cells N86-17853

PROTON ENERGY

Difficulties with inferring neutron cross sections from charged-particle reactions [DE86-000020] N86-18149

PROTON IRRADIATION

Damage-rate gradient effects on radiation-induced segregation and phase stability in irradiated alloys [DE85-016605] N86-17540

Photon radiation effects on CdS/CuInSe2 thin film solar cells N86-17857

PROTON SCATTERING

Group representation matrix and scattering from nuclei [DE85-017527] N86-18139

PROTONS

Position sensitive gas counter readout system [DE85-017953] N86-17713

The np elastic-scattering experiments with polarized neutron beams [DE85-018454] N86-18148

Radioactive ion beam research at LLNL [DE85-018183] N86-18156

PROTOTYPES

A high power, pulsed microwave tube for a synthetic aperture radar electrical model. Phase 2: Manufacture and test [EVT-852] N86-17632

PSYCHOLOGICAL EFFECTS

Psychological problems associated with the wearing of respiratory protective devices: A review [FOA-C-40216-C2] N86-17995

PSYCHOLOGICAL FACTORS

Psychological problems associated with the wearing of respiratory protective devices: A review [FOA-C-40216-C2] N86-17995

PSYCHOPHYSIOLOGY

Color on displays. Part 1: The psychophysical and physiological aspects [IZF-1985-11] N86-17994

PULSE COMMUNICATION

A model for the analysis of orthogonal modulation methods for digital transmission [FI-445-TBR-23] N86-17602

PULSE DURATION MODULATION

Digital structure of an autopiloting for asynchronous machine fed by Pulse Width Modulation (PWM) converter N86-17438

Exact continuous models of Pulse Width Modulation (PWM) regulators in both continuous and discontinuous conduction modes --- spacecraft power supplies N86-17459

PULSE WIDTH AMPLITUDE CONVERTERS

Digital structure of an autopiloting for asynchronous machine fed by Pulse Width Modulation (PWM) converter N86-17438

PULSED LASERS

Metrological provision for measurement of relative energy density distribution over beam cross section and of beam divergence in pulse lasers N86-17643

Multichannel commutators of analog signals for measurement of energy distribution over beam cross section of pulse laser N86-17644

The 400-channel commutator for measurement of energy distribution in laser beam N86-17645
Photoelectric instrument for measuring relative energy density distribution in beams of pulse lasers N86-17647

PULSED RADIATION
Microwave detector
[DE85-017797] N86-17711
Status of the intense pulsed neutron source
[DE85-018387] N86-18170

PULSES
Apparatus for laser beam profile measurements
[DE85-017789] N86-17740

PUMPS
LOX/LH2 vane pump for auxiliary propulsion systems N86-17397
Development of a continuous-flow fluidic pump
[DE85-018152] N86-17755

PUSHBROOM SENSOR MODES
Development of scanner digital image acquisition for photogrammetry
[MBB-UA-876/85] N86-17827

PYROLYSIS
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501
A reference survey of pyrolysis of explosives
[FOA-C-20580-D1] N86-17581
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879

PYROTECHNICS
Design and development of a pyrotechnique arming and firing unit --- spacecraft pyrotechnics N86-17465

Q

QUALITATIVE ANALYSIS
Physical and chemical characterization of multilayered structures
[DE85-016922] N86-17624

QUALITY
Characterizing software with objective measurements
[AD-A160018] N86-18014

QUALITY CONTROL
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354
Software quality metrics of the Faint Object Camera (FOC) image processing software
[ESA-CR(P)-2039] N86-17716
A concept for the quality assurance of ceramic gas turbine components using nondestructive tests
[BMFT-FB-T-85-094] N86-17773
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019

QUANTITATIVE ANALYSIS
Dose of PES (plasticizer) in a BSL914 resin using different standards --- liquid chromatography
[CEAT-NT-15/M/85] N86-17521
Impregnant composition in dispenser cathodes
[AD-A160044] N86-17622

QUANTUM CHROMODYNAMICS
Chiral symmetry on the lattice with Wilson fermions
[PREPRINT-452] N86-18080
Applications of quantum chromodynamics to hadronic and nuclear interactions
[DE86-000054] N86-18150

QUANTUM EFFICIENCY
Investigation of the quantum efficiency of optical heterodyne detectors
[NASA-CR-176489] N86-18179

QUANTUM ELECTRODYNAMICS
Absolute wavelength measurement and fine structure determination in (7)Li 2
[DE85-018382] N86-18235

QUANTUM MECHANICS
Lie-isotopic algebraic approach to formal nonpotential scattering theory
[PREPRINT-456] N86-18081
Quantum resonances in physical tunneling
[DE85-017558] N86-18214
Absolute wavelength measurement and fine structure determination in (7)Li 2
[DE85-018382] N86-18235
Towards a nonpotential scattering theory
[PREPRINT-454] N86-18240

QUANTUM THEORY
Towards a nonpotential scattering theory
[PREPRINT-454] N86-18240

QUANTUM WELLS
GaAs/In/sub 0.25/Ga/sub 0.75As/GaAs, modulation-doped, single, strained quantum-well FET
[DE85-018272] N86-18221

QUARKS
Quark dynamics of N anti N annihilation
[DE85-017508] N86-18153
Neutrinoless double beta decay and multiquark states in nuclei
[PREPRINT-449] N86-18159
New and old accelerators: What can they do for astrophysics
[DE85-013220] N86-18165
Indiana University High Energy Physics Group
[DE85-012000] N86-18169
Commutator of the quark mass matrices in the standard electroweak model and a measure of maximal CP-violation
[USIP-85-14] N86-18173

QUARTZ TRANSDUCERS
Development of a piezoelectric quartz pressure sensor for avionics with excellent long term stability (with final demonstration of the results on a prototype)
[BMFT-FB-W-85-010] N86-17353

QUASARS
Observations of extragalactic radio sources at 6 and 13.5 mm N86-18269
Red shift radiation: A major electromagnetic radiation measurement N86-18270

QUENCHING (COOLING)
The effect of quenching rate on the temperature and strain-rate sensitivity of uranium 2w/o molybdenum alloy
[OUEL-1577/85] N86-17528

R

RADAR DETECTION
Calculating radar detection probabilities by contour integration N86-17590

RADAR EQUIPMENT
Beam steerable microwave antenna for automotive radar application N86-17591
Microwave sensor design using CAD techniques
[AD-A159518] N86-17617

RADAR IMAGERY
Study of a land use of synthetic aperture radar, executive summary
[ESA-CR(P)-2067-VOL-1] N86-17825
Study of a land use of synthetic aperture radar. Volume 1: Main report
[ESA-CR(P)-2067-VOL-2] N86-17826

RADAR TRACKING
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
Comparison of a jump-diffusion tracker with a Kalman tracker: An evaluation with emphasis on air traffic control
[NLR-TR-83063-U] N86-17335

RADAR TRANSMITTERS
A pulsed 8 W FET power amplifier at 9.4 Ghz
[FOA-C-30402-E] N86-17613

RADIAL VELOCITY
Photometry and radial velocities of 27 southern galactic Cepheids N86-18273

RADIANCE
Some aspects of the atmospheric radiance model of LOWTRAN 6
[DFVLR-FB-85-33] N86-17945

RADIANT FLUX DENSITY
Dependence of error of measurement of relative energy or power density distribution over cross section of laser beam on space factor of multielement radiation transducer N86-17646

RADIANT HEATING
Heat transfer in internal combustion engines
[DE85-011495] N86-17757

RADIATION
Basic aspects of ion beam mixing
[DE85-018391] N86-18145

RADIATION DAMAGE
Damage-rate gradient effects on radiation-induced segregation and phase stability in irradiated alloys
[DE85-016605] N86-17540
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854
Radiation damage in high-resistivity silicon solar cells N86-17856
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858
Depletion layer recombination effects on the radiation damage hardness of gallium arsenide cells N86-17859

RADIATION DETECTORS
Coupling between plastic scintillators and light fibers for remote detection of X-rays
[DE85-016948] N86-17707
Study of optical transition radiation produced by 30 to 70 MeV energy electrons: Application to the diagnostics of beams with charged particles. Chapter 2: Description of the experimental device. Chapter 6: Experiments with transition radiation interference
[DE86-001258] N86-18158
Review of high bandwidth fiber optics radiation sensors
[DE85-017559] N86-18183

RADIATION DOSAGE
Radiation exposure and performance of multiple burn LEO-GEO orbit transfer trajectories N86-17417

RADIATION EFFECTS
Effects of high energy radiation on the mechanical properties of epoxy-graphite fiber reinforced composites
[NASA-CR-176487] N86-17478
Damage-rate gradient effects on radiation-induced segregation and phase stability in irradiated alloys
[DE85-016605] N86-17540
Photon radiation effects on CdS/CuInSe2 thin film solar cells N86-17857
Space Environment Workshop N86-17871

RADIATION HARDENING
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Depletion layer recombination effects on the radiation damage hardness of gallium arsenide cells N86-17859

RADIATION MEASUREMENT
Method of measuring emittance of thermal insulation materials at low temperatures N86-17650
Neutron dosimetry intercomparison at the National Physics Laboratory
[NPL-RS(EXT)-79] N86-18135

RADIATION PROTECTION
Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864

RADIATION SPECTRA
Determination of spectral distributions and instrumental magnitudes of planets
[ESA-STR-214] N86-18280

RADIATION THERAPY
Excimer laser phototherapy for the dissolution of abnormal growth
[DE85-017803] N86-17741

RADIATION TOLERANCE
A possible radiation-resistant solar cell geometry using superlattices N86-17851
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864

RADIATIVE LIFETIME
The interaction between electric dipoles and waveguiding surfaces at optical frequencies N86-18178

RADIO ALTIMETERS
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
Applications and scientific uses of ERS-1 radar altimeter data
[ESA-CR(P)-2084] N86-17823
A study of ERS-1 radar altimeter data processing requirements
[ESA-CR(P)-2073] N86-18028

RADIO ASTRONOMY
Proceedings of the 19th Finnish Astronomers' Days
[REPT-S-162] N86-18258

RADIO COMMUNICATION
Report on the joint activities of the Ugo Bordoni Foundation and the Istituto Superiore delle Poste e delle Telecomunicazioni --- communications research N86-17603

RADIO FILTERS
The use of filters in digital coherent receivers operating in a jamming and noise environment
[AD-A159792] N86-17596

RADIO FREQUENCIES
Class E frequency multipliers N86-17615
Measurement of velocity of object moving near large reflecting surface N86-17649
Experimental studies of radio frequency waves and confinement in the Auburn Torsatron
[DE85-017189] N86-18199

RADIO NAVIGATION
Establishment and use of time unification system for civil aviation N86-17648

RADIO RECEIVERS
Cryogenic millimeter wave receiver for the Metsaehovi radio telescope N86-18267

RADIO SOURCES (ASTRONOMY)
Proceedings of the 19th Finnish Astronomers' Days
[REPT-S-162] N86-18258
Optical study of Sharpless 252 (NGC 2175) N86-18268

RADIO TELESCOPES
Computers at the Metsaehovi (Finland) radio research station N86-18265

Analog to digital (A/D) conversion at the Metsaehovi (Finland) Radio Research Station N86-18266
Cryogenic millimeter wave receiver for the Metsaehovi radio telescope N86-18267

RADIO TRANSMISSION
Area coverage of radio networks: Method description and propagation measurements in urban area
[FOA-C-30397-E2] N86-17612
Research on propagation of decimetric radiowaves at high latitudes N86-17641

RADIOACTIVE CONTAMINANTS
Sensitivity, applicability and validation of bi-Gaussian off- and on-line models for the evaluation of the consequences of accidental releases in nuclear facilities --- air pollution
[EUR-9385-EN] N86-17897

RADIOACTIVE DECAY
Neutrinoless double beta decay and multiquark states in nuclei
[PREPRINT-449] N86-18159
The F meson background and F candidates in 360 GeV c/Pi(-) p and pp interactions
[USIP-85-15] N86-18174

RADIOACTIVE MATERIALS
Physiochemical transformation of radioactive nuclei in water environments
[CISE-2694] N86-17914

RADIOACTIVE WASTES
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937
Northeastern regional geologic characterization report. Volume 3: Plates
[DE86-000418] N86-17938

RADIOGRAPHY
Determining behavior of solid rocket motor internal components using dynamic real-time radiography N86-17382

RADIOISOTOPE BATTERIES
Interplanetary exploration-A challenge for photovoltaics N86-17861

RADIOMETRIC CORRECTION
Analysis of the radiometric relation between false color aerial photographs and multispectral scanning (MSS) images
[MDLK-R-8337] N86-17829

RAMAN SPECTRA
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes
[AD-A158468] N86-17533
Improved fiberoptic spectrophotometer
[DE85-017792] N86-17710
Theoretical studies of Resonance Enhance Stimulated Raman Scattering (RESRS) of frequency doubled Alexandrite laser wavelengths in cesium vapor
[NASA-CR-176464] N86-17731

RAMJET ENGINES
Thrust measurements for ramjet performance documentation N86-17401

RANDOM LOADS
Estimation of load exceedances of an aircraft under carriage with nonlinear properties excited by random runway unevenness
[NLR-TR-84030-U] N86-17348

RANDOM NOISE
Uncorrelated noise in turbulence measurements
[PB85-212314] N86-17968

RANDOM VIBRATION
Structural responses in a random environment --- mechanical or acoustical excitation
[CNES-NT-115] N86-17800

RANKINE CYCLE
Analysis of the solar powered/fuel assisted Rankine cycle cooling system. Phase 1: Revision
[DE85-016173] N86-17675
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876
ALKACYCL: A basic computer program for the analysis of alkali metal Rankine power cycles
[DE85-018125] N86-18022

RARE EARTH ALLOYS
A CSMP commutation model for design study of a brushless dc motor power conditioner for a cruise missile fin control actuator
[AD-A159855] N86-17621

RARE EARTH ELEMENTS
Rare earth chemical and physical metallurgy
[DE85-015536] N86-17537

RARE GASES
Method of synthesizing and growing copper-indium-diselenide (CuInSe2) crystals
[DE85-017729] N86-18215

RAREFIED GASES
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270

RAY TRACING
Anamorphic gradient index lens systems N86-18177

RAYLEIGH WAVES
Elastic wave gyrometer
[REPT-26/5052] N86-17724

REACTION KINETICS
Reaction enhancement of heterogeneously catalyzed reactions by concentration forcing
[DE86-000220] N86-17514
Compound nucleus studies with reverse kinematics
[DE85-016630] N86-18138

REACTIVITY
Catalytic reactivity of thin crystal surfaces
[DE85-018293] N86-18228

REACTOR DESIGN
Engineering characterization of ground motion. Task 2: Effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects
[TI85-901169] N86-17796
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219

REACTOR MATERIALS
Survey of physical property data for several alloys
[DE85-018138] N86-17542
Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799

REACTOR SAFETY
Parametric study of the amplification factor in the energy balance method
[TI85-010472] N86-18111

REAL TIME OPERATION
Determining behavior of solid rocket motor internal components using dynamic real-time radiography N86-17382
Computer simulation of environmental, hazard scenarios in space N86-17411
On-line superposition of geographical data to TIROS-N type meteorological satellite images
[NLR-TR-82133-U] N86-17962
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115

RECHARGING
Temperature derivative battery charge control N86-17445

RECIRCULATIVE FLUID FLOW
Development of a two-scale turbulence model and its application N86-17662

RECOIL PROTONS
Large-t elastic scattering and diffraction dissociation
[NIKHEF-H/85-4] N86-18163

RECOMBINATION REACTIONS
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
Superlattices and multilayer structures for high efficiency solar cells N86-17850
A possible radiation-resistant solar cell geometry using superlattices N86-17851
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854
Depletion layer recombination effects on the radiation damage hardness of gallium arsenide cells N86-17859

RECOVERABILITY
Burst annealing of electron damage in silicon solar cells N86-17853

RECOVERY PARACHUTES
Introduction to deployable recovery systems
[DE86-000048] N86-17310

RECRYSTALLIZATION
Structure-property studies in the deformation of semi-crystalline polymers N86-17565

RECTANGULAR PLATES
Study of plate impedances
[ESA-CR(P)-2086] N86-17802

RECTIFIERS
Calculation methods for short-circuit currents in three-phase bridge rectifier circuits N86-17444

RECURSIVE FUNCTIONS
A generalized diagram for various parameter estimation methods; the coherence in pseudo-linear regression schemes
[ER-83/07] N86-18095

RED SHIFT
Red shift radiation: A major electromagnetic radiation measurement N86-18270

REDUCED GRAVITY
Orbital transfer vehicle engine integration study N86-17416

REDUCTION (CHEMISTRY)
Reduction of aliphatic nitrocompounds on nonoxidised and oxidised carbon fibre electrodes
[BR97661] N86-17471
Influence of catalytic additions on ferric-oxide reduction
[BLL-BISI-23009-(9022.060)] N86-17526

REFLECTANCE
Thin film coatings for improved alpha/epi N86-17867

REFRACTIVITY
A CO2 laser scintillometer for C(2) sub n measurements over a many kilometer path
[KNMI-TR-67] N86-17743
Nonlinear refractive index measurements of isotropic liquid crystals
[AD-A159519] N86-18209

REFRACTORIES
Development of refractory composites with improved fracture toughness
[DE86-000257] N86-17479
Chemically bonded ceramic materials for use in thermal energy storage devices
[DE85-018078] N86-17572

REFRACTORY METALS
Oxidation resistant coatings for refractory metals N86-17399
The boriding of refractory metals
[BLL-BISI-23037-(9022.060)] N86-17527

REFRIGERANTS
Corrosion of materials in absorption heating and refrigeration fluids
[DE85-018140] N86-17585
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885

REFRIGERATORS
Experimental results on a low-temperature magnetic refrigerator
[DE85-017541] N86-17583
Operational tests of the BNL 24.8 kW, 3.8 K helium refrigerator
[DE85-017851] N86-17584

REGENERATORS
Efficiency calculation for gas turbines: Searching for simple relations between thermodynamic efficiency of a gas turbine and efficiency determining parameters
[SS-44] N86-17766

REGRESSION ANALYSIS
Low-fin staggered tube banks: Heat transfer and pressure-loss for turbulent single-phase crossflow
[ESDU-84016] N86-17664
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017
A FORTRAN 77 program and user's guide for the calculation of partial correlation and standardized regression coefficients
[TI85-016573] N86-18018
A generalized diagram for various parameter estimation methods; the coherence in pseudo-linear regression schemes
[ER-83/07] N86-18095
Modified confidence intervals for the mean of an autoregressive process
[AD-A160055] N86-18107

REGRESSION COEFFICIENTS
A FORTRAN 77 program and user's guide for the calculation of partial correlation and standardized regression coefficients
[TI85-016573] N86-18018

REGULATIONS
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport
[REPT-1] N86-17985

RELAXATION METHOD (MATHEMATICS)
Numerical analysis for steady transonic flows past an airfoil using AF scheme N86-17289

RELAXATION TIME
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220

RELIABILITY
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354
Reliability of nondestructive inspection
[NLR-TR-84011-U] N86-17775
A systolic array implementation of a Reed-Solomon encoder and decoder
[AD-A159824] N86-18011
Characterizing software with objective measurements
[AD-A160018] N86-18014
Performance and reliability analysis using directed acyclic graphs
[AD-A160313] N86-18016

Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104

REMOTE CONTROL
Advanced servomanipulator development
[DE85-017720] N86-17989

REMOTE SENSING
Remote and in-situ analysis
[DE85-017397] N86-17515
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815
Spectroradiometric calibration of the Thematic Mapper and multispectral scanner system
[E86-10022] N86-17816
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
Contributions to geodesy, photogrammetry, and cartography, series 2
[ISSN-0469-4244] N86-17818
Integration of remote sensing data and cartographic data bases into a land information system N86-17820
Development of scanner digital image acquisition for photogrammetry
[MBB-UA-876/85] N86-17827
Geometric correction of remote sensing images by means of ground control points
[MDLK-R-8429] N86-17828
Activities report in remote sensing training N86-17830
Hydrological description of a study area around pump station 't Klooster (the Netherlands); application of hydrological models and remote sensing
[NOTA-1542] N86-17831
Simple method for the determination of regional daily evapotranspiration of crops using remote sensing
[NOTA-1580] N86-17832
Study of effects of pump station Olden Eibergen (Netherlands) on agriculture using remote sensing and hydrological models
[NOTA-1544] N86-17833
A program for International Polar Oceans Research (PIPOR)
[ESA-SP-1074] N86-17972

REMOTE SENSORS
Microwave sensor design using CAD techniques
[AD-A159518] N86-17617
Estimation of sea-surface windspeed from whitecap cover: Statistical approaches compared empirically and by simulation
[AD-A159816] N86-17969

REPORTS
South African Astronomical Observatory Circular No. 9
[SAAOC-9] N86-18271

REPUBLIC OF SOUTH AFRICA
South African Astronomical Observatory Circular No. 9
[SAAOC-9] N86-18271

REQUIREMENTS
The Giotto power supply subsystem N86-17436

RESCUE OPERATIONS
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329

RESEARCH
Space Station Engineering and Technology Development. Proceedings of the Panel on Program Performance and Onboard Mission Control
[NASA-CR-176484] N86-17372
Bibliography of research on ocean fronts, 1964-1984
[AD-A160040] N86-17970
Propositions to implement a computerized private document retrieval system. Presentation of the Personalized Documentation Aid Tool (OPAD)
[ENST-85E001] N86-18248

RESEARCH AND DEVELOPMENT
Elastomeric Barrier Pulse Motors N86-17385
Technology achievements and projections for communication satellites of the future
[NASA-TM-87201] N86-17595
Activities report of the Department of Systems and Communications, CNRS-UA 820
[ENST-85D002] N86-17611
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875
Electrochemical storage and conversion: Batteries and fuel cells
[DE85-018177] N86-17886
Publications, catalog 1985 N86-18249

RESERVOIRS
Water resources data for Oklahoma, water year 1983
[PB85-236289] N86-17834

RESIDENTIAL ENERGY
Vapor compression heat pump system field tests at the TECH complex
[DE85-016364] N86-17670

RESIDUAL STRENGTH
Residual strength of bonded stiffened panels: Prediction and experimental verification
[NLR-TR-83066-U] N86-17808

RESIN MATRIX COMPOSITES
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites
[OUEL-1578/85] N86-17480
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites
[OUEL-1579/85] N86-17481
Elementary characterization of the Rigidite 5245C/IM6 preimpregnated carbon from NARMCO U.S., test report M3-449000, part 2
[PV-M3-449000-PT-2] N86-17489
Physical chemical characterization tests of the 5245C NARMCO preimpregnation resin, test report M3-449000, part 1 — carbon fiber impregnation
[PV-M3-449000-PT-1] N86-17490
Dose of PES (plasticizer) in a BSL914 resin using different standards — liquid chromatography
[CEAT-NT-15/M/85] N86-17521

RESINS
Chemical characterization of polyethylene resins and polyethylene gas pipe
[DE85-018346] N86-17573

RESISTANCE THERMOMETERS
Temperature fixed points. 1: Possible devices in the range 0 to 125 C
[NPL-QU-70] N86-17701

RESISTOJET ENGINES
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426

RESONANCE
Quantum resonances in physical tunneling
[DE85-017558] N86-18214

RESONATORS
Study of a resonant converter using power transistors in a 25 kW X-ray tube power supply N86-17466
Application of surface acoustic wave resonators to quartz bending beams as integrated dilation recorders in balances (load cells)
[BMFT-FB-T-85-058] N86-17803

RESOURCE ALLOCATION
Sources of information on engineering geology and related topics for northeastern Illinois
[PB85-241933] N86-17948

RESPIRATORS
Expedient methods of respiratory protection. 3: Submicron particle tests and summary of quality factors
[TI85-018278] N86-17983

RESPIRATORY DISEASES
Expedient methods of respiratory protection. 3: Submicron particle tests and summary of quality factors
[TI85-018278] N86-17983

RESPONSES
Shock response spectrum at low frequencies
[DE85-018273] N86-17797

RETROFITTING
Improved space motor demonstration N86-17413

REUSABLE ROCKET ENGINES
Design optimization for a space based, reusable orbit transfer vehicle N86-17418

REUSABLE SPACECRAFT
Cyclic structural analyses of anisotropic turbine blades for reusable space propulsion systems N86-17404
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405

REVERBERATION
Speech processing for intelligibility improvement
[IZF-1985-14] N86-17610

REVERSE FIELD PINCH
Measurement of Faraday rotation in twisted optical fiber using rotating polarization and analog phase detection
[DE85-015704] N86-17737

REVERSING
Magnetization reversal in triaxial single-domain particles N86-17651
Reversible component of magnetic induction in magnetically soft materials during magnetization reversal N86-17654

REYNOLDS NUMBER
Direct simulation of the incompressible flow at high Reynolds number by finite difference method N86-17276
Analysis of high Reynolds number transonic flow around an airfoil N86-17293
The comparison of the transonic airfoil calculation by NSFOIL with the wind tunnel test data at high Reynolds number N86-17295
Low Reynold's number boundary layers in a disturbed environment
[NASA-CR-175031] N86-17665

RHENIUM
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426

RHEOLOGY
The nature of charge carriers in electrorheological suspensions
[BR97662] N86-17500

RIGID STRUCTURES
Integrability of two interacting N-dimensional rigid bodies
[PREPRINT-450] N86-18079

ROBOTICS
Robotic deburring: A bibliography
[DE85-015760] N86-17750

ROBOTS
Weld seam-tracking with an optical sensor using structured light N86-17764
Some aspects of the dynamic behavior of an assembly robot N86-17765
Design for a path control algorithm of a robot arm with external sensor control N86-18057

ROCK MECHANICS
Rock failure criteria for design of underground structural supports
[AD-A159807] N86-17932

ROCKET ENGINE DESIGN
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387

ROCKET ENGINES
Bipropellant Earth storable rocket engines for satellites: A 1985 update N86-17398

ROCKET NOZZLES
Low cost carbon/carbon nozzles for solid rocket motors N86-17381
Thrust vector technology demonstration N86-17384

ROCKET OXIDIZERS
The effects of surface pretreatment and nitrogen tetroxide purification on the corrosion rate of Type 304L stainless steel N86-17396

ROCKET SOUNDING
Waves with harmonic structure below and above the Lower Hybrid Resonance (LHR) observed on the Cleft Energetics Transport and Ultraviolet Radiation (CENTAUR) 35.001 and 35.002 rockets
[DRI-2-85] N86-17946

ROCKET THRUST
The effect of engine design characteristics on orbital transfer vehicle performance N86-17419
Solar thermal rocket design and fabrication N86-17428

ROLLERS
Development of a manufacturing procedure to produce cold rolling cylinders by deposing a high alloy steel layer on a normal steel cylinder
[REPT-1645] N86-17586

ROLLING CONTACT LOADS
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748

ROLLING MOMENTS
Estimation of sideforce, yawing moment and rolling moment derivatives due to rate of yaw for complete aircraft at subsonic speeds
[ESDU-84002] N86-17357

ROOTS OF EQUATIONS
Software for rootfinding and interpolation with Runge-Kutta-Sarafyan methods
[DE85-018113] N86-18070

ROSAT MISSION
X-ray satellite
[NASA-TM-77997] N86-17370

ROTARY WINGS
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 1: Background and fatigue evaluation
[RAE-TR-84084] N86-17336
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 2: Final definition of Helix and Felix
[RAE-TR-84085] N86-17337
Effect of dynamic stall and elastic parameters on the fundamental mechanisms of helicopter vibrations
[AD-A160022] N86-17355

ROTATING DISKS
The rotating disk and the yield conditions of Tresca and von Mises
[LAB-REPT-759] N86-17810

ROTATING SPHERES
Machine imparting complex rotary motion for lapping a spherical inner diameter
[DE85-017790] N86-17754

ROTATION
Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects
[NASA-TM-87207] N86-17789
Drift modes with differential rotation and passing electrons
[DE85-017243] N86-18151
Analysis of the unbalanced NBI rotation experiments in the ISX-B, PLT and PDX Tokamaks
[DE85-017616] N86-18193

ROTOR AERODYNAMICS
Comment on the yaw stability of a horizontal-axis wind turbine at small angles of yaw
[NPL-MP-84084-U] N86-17312

ROTOR BLADES (TURBOMACHINERY)
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356

ROTORS
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
Scale model of the SWD 5000 LW rotor wind tunnel tests for different blade setting angles --- windpowered pumps
[WM-074] N86-17313
Determining spatial orientation of axes of elliptical magnetic field N86-17652

RP-1 ROCKET PROPELLANTS
Oxygen/hydrocarbon combustion devices technology N86-17407

RUBBER
Oxyluminescence study of the degradation of filled and unfilled rubbers
[BR94542] N86-17567
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568

RUN TIME (COMPUTERS)
Three-dimensional flight-path reconstruction by means of spline approximation
[NLR-TR-83091-U] N86-17347
The use of vector computers in aerodynamic computations
[NLR-MP-84051-U] N86-18031
An explicit scheme for the prediction of ocean acoustic propagation in three dimensions
[AD-A160053] N86-18125

RUNGE-KUTTA METHOD
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699
Software for rootfinding and interpolation with Runge-Kutta-Sarafyan methods
[DE85-018113] N86-18070
Explicit Runge-Kutta (-Nystroem) methods with reduced phase errors for computing oscillating solutions
[CWI-NM-R8504] N86-18088
Convergence and order reduction of diagonally implicit Runge-Kutta schemes in the method of lines
[CWI-NM-R8506] N86-18089

RUNWAYS
Estimation of load exceedances of an aircraft under carriage with nonlinear properties excited by random runway unevenness
[NLR-TR-84030-U] N86-17348

RURAL AREAS
The 1984 L-band radar experiment. Part 1: Ground truth Flevo (Netherlands) 1984 --- SIR-B N86-17609

S

S MATRIX THEORY
Lie-isotopic algebraic approach to formal nonpotential scattering theory
[PREPRINT-456] N86-18081
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100
Towards a nonpotential scattering theory
[PREPRINT-454] N86-18240

SAFETY
Report on Kevlar -49 composite pressure vessel safety technology program N86-17412
Study on a city's safety: Poitiers (France)
[SNIAS-852-422-104] N86-18257

SAFETY DEVICES
Fast cook-off tests of the AMRAAM air vehicle N86-17389
Evaluation of functional experience with safety valves
[BMI-1985-080] N86-17760
Psychological problems associated with the wearing of respiratory protective devices: A review
[FOA-C-40216-C2] N86-17995

SAILWINGS
Low speed aerodynamic characteristics of a two-dimensional sail wing with adjustable slack of the sail
[VTH-LR-307] N86-17314

SAMPLING
The indexing properties of an ancillary statistic
[AD-A160030] N86-18105
How many bootstraps?
[AD-A160043] N86-18106

SANITATION
Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
[MBL-1985-6] N86-17980

SATELLITE ATTITUDE CONTROL
Bipropellant Earth storable rocket engines for satellites: A 1985 update N86-17398

SATELLITE CONFIGURATIONS
Configuration study of the NAVSAT system satellites
[ITS-TR-011/85] N86-17374

SATELLITE IMAGERY
Functional built-in-test in a pipeline image processor --- satellite imagery
[NLR-MP-84020-U] N86-17379
Improved blue response CCD-MA357 detectors --- spaceborne imaging
[GEC-16,879C] N86-17718

SATELLITE NAVIGATION SYSTEMS
Study of user segment of Navsat
[ESA-CR(P)-2089] N86-17332
Configuration study of the NAVSAT system satellites
[ITS-TR-011/85] N86-17374
Activities report in aerospace research, with data concerning the scientific committee NLR-NIVR, international cooperation concerning AGARD, DNW, GARTEUR and cooperation with Indonesia N86-17588

SATELLITE NETWORKS
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-1] N86-17365
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-2] N86-17366

SATELLITE ORBITS
Configuration study of the NAVSAT system satellites
[ITS-TR-011/85] N86-17374

SATELLITE POWER TRANSMISSION (TO EARTH)
Microwave electric propulsion for orbit transfer applications N86-17429

SATELLITE TELEVISION
The 230W Traveling Wave Tube Amplifier (TWTA) power supply design --- Olympus television satellite N86-17453
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder --- Olympus television satellite N86-17454

SATELLITE TEMPERATURE
A review of space-related thermophysical research at NLR
[NLR-MP-84063-U] N86-18256

SATELLITE-BORNE INSTRUMENTS
The hot plasma spectrometers on Viking
[KGI-PREPRINT-077] N86-17377

SATELLITE-BORNE PHOTOGRAPHY
On-line superposition of geographical data to TIROS-N type meteorological satellite images
[NLR-TR-82133-U] N86-17962

SATELLITE-BORNE RADAR
Study of a land use of synthetic aperture radar, executive summary
[ESA-CR(P)-2067-VOL-1] N86-17825
Study of a land use of synthetic aperture radar. Volume 1: Main report
[ESA-CR(P)-2067-VOL-2] N86-17826

SATURN (PLANET)
Observations of the J = 10 manifold of the pure rotational band of phosphine on Saturn
[NASA-TM-86851] N86-18277

SATURN ATMOSPHERE
Observations of the J = 10 manifold of the pure rotational band of phosphine on Saturn
[NASA-TM-86851] N86-18277

SCALE MODELS
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801

SCALING LAWS
Collective effects and lattice implications for an FEL bypass ring
[DE85-016563] N86-17735

SCATTERING CROSS SECTIONS
Recent results of the study of photon-photon collisions
[DE85-018110] N86-18140
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143
New results on Bhabha scattering at 29 GV
[DE85-018408] N86-18146
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
Investigations of the interaction between Na(3P) and K(4S) using measurements of the differential scattering cross section
[MPIS-7/1985] N86-18162

SCATTEROMETERS
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817

SCHOTTKY DIODES
Cryogenic millimeter wave receiver for the Metsaehovi radio telescope N86-18267

SCHROEDINGER EQUATION
Quantum resonances in physical tunneling
[DE85-017558] N86-18214

SCINTILLATION COUNTERS
Coupling between plastic scintillators and light fibers for remote detection of X-rays
[DE85-016946] N86-17707
A CO2 laser scintillometer for C(2) sub n measurements over a many kilometer path
[KNMI-TR-67] N86-17743
NE-213-scintillator-based neutron detection system for diagnostic measurements of energy spectra for neutrons having energies greater than or equal to 0.8 MeV created during plasma operations at the Princeton Tokamak Fusion Test Reactor
[DE85-018079] N86-18198

SEA GRASSES
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterschelde (the Netherlands)
[MDLK-R-8509] N86-17722

SEA ICE
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
Applications and scientific uses of ERS-1 radar altimeter data
[ESA-CR(P)-2084] N86-17823
A study of ERS-1 radar altimeter data processing requirements
[ESA-CR(P)-2073] N86-18028

SEALS (STOPPERS)
Advanced seals for Liquid Oxygen (LOX) turbopumps N86-17408

SEARCHING
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329

SEAWEEDS
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterschelde (the Netherlands)
[MDLK-R-8509] N86-17722

SEDIMENTS
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123

SEISMIC WAVES
The Norwegian Seismic Array (NORSAR)
[AD-A159820] N86-17933
Natural Phenomena Hazards Modeling Project. Extreme wind/tornado hazard models for Department of Energy sites. Revision 1
[DE85-018156] N86-17957

SEISMOLOGY
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 1: Kinematics of Basin-Range intraplate extension
[NASA-CR-176498] N86-17928
The Norwegian Seismic Array (NORSAR)
[AD-A159820] N86-17933
An approach to the quantification of seismic margins in nuclear power plants
[TI85-017151] N86-17934
Multiwell Experiment Geophysics Program
[DE86-001147] N86-17940

SELF ADAPTIVE CONTROL SYSTEMS
Generalized predictive control. Part 2: Extensions and interpretations
[OUEL-1557/84-PT-2] N86-18054

Self-tuning control: Algorithms and applications
[OUEL-1567/85] N86-18055

SELF OSCILLATION
Nonlinear systems: An introduction to describing functions
[ESDU-84009] N86-18058

SEMANTICS
Transition systems, infinitary languages and the semantics of uniform concurrency
[CWI-CS-R8506] N86-18034
Infinite streams and finite observations in the semantics of uniform concurrency (preliminary version)
[CWI-CS-R8508] N86-18036

SEMICONDUCTOR JUNCTIONS
Improved method of preparing p-i-n junctions in amorphous silicon semiconductors
[DE85-017736] N86-18217

SEMICONDUCTORS (MATERIALS)
Investigation of electrochemical corrosion of semiconductors
[DE85-016853] N86-17541
Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880
Activities report in fundamental research on matter (FOM) N86-18118
Method of synthesizing and growing copper-indium-diselenide (CuInSe2) crystals
[DE85-017729] N86-18215
Process for selectively patterning epitaxial film growth on a semiconductor substrate
[DE85-017733] N86-18216
Improved method of preparing p-i-n junctions in amorphous silicon semiconductors
[DE85-017736] N86-18217
Narrow band gap amorphous silicon semiconductors
[DE85-017753] N86-18218

SENSITIVITY
Development of a sensitivity analysis technique for multiloop flight control systems
[NASA-CR-166619] N86-17358
Factors affecting Pi sub k in HTPB formulations N86-17390
Remote and in-situ analysis
[DE85-017397] N86-17515
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017
Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104

SEPARATED FLOW
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
A study of high Reynolds number laminar separation N86-17302
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304
Vacuum chamber pressure effects on thrust measurements N86-17425
A theoretical and experimental study of noncondensible turbulent bubbly jets N86-17661

SEPARATORS
Sample selection and testing of separation processes
[NASA-CR-176569] N86-17502
Improved separators for silver-hydrogen cells
[AERE-R-11513] N86-17633

SERVOMECHANISMS
Advanced servomanipulator development
[DE85-017720] N86-17989

SERVOMOTORS
Some aspects of the dynamic behavior of an assembly robot N86-17765

SET THEORY
Performance evaluation of nonlinear optimization methods via pairwise comparison and fuzzy number
[REPT-84-40] N86-18098
An automatic proof procedure for several geometries (report 1)
[REPT-84-42] N86-18099

SHAPES
Evolution of nuclear shapes at high spins
[DE85-018074] N86-18142

SHEAR FLOW
Experimental generation of stratified shear flows
[AD-A160304] N86-17668

SHEAR LAYERS
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301

SHEAR PROPERTIES
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748

SHEAR STRENGTH
Effect of carbon fiber surface treatment on moisture absorption and interlaminar shear strength of carbon fibre/epoxy resin composites
[RAE-TR-84047] N86-17474
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477

SHEAR STRESS
Initial results for the failure strength of a LOVA gun propellant at high pressures and various strain rates N86-17402

SHEARING
Viscosity, granular-temperature and stress calculations for shearing assemblies of inelastic: Frictional disks
[DE85-015173] N86-17794

SHELL STABILITY
Bifurcation and stability, a numerical approach
[NLR-MP-84078-U] N86-18085

SHELLS (STRUCTURAL FORMS)
A double-curved triangular shell element allowing the analysis of shell problems in the plastic domain
[LAB-REPT-761] N86-17811

SHIELDING
Detailed design of a 13 kA 13 kV dc solid-state turn-off-switch
[DE85-013874] N86-17623

SHIPS
Helicopter-ship qualification testing
[NLR-MP-84062-U] N86-17343
International list of selected, supplementary and auxiliary ships --- WMO
[WMO-47-ED-85] N86-17971

SHOCK HEATING
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672

SHOCK LAYERS
Experimental study of the shock wave-turbulent boundary layer interaction
[DE85-016583] N86-17676

SHOCK LOADS
Close-in characteristics of LH2/LOX reactions N86-17410

SHOCK SPECTRA
Shock response spectrum at low frequencies
[DE85-018273] N86-17797

SHOCK WAVE INTERACTION
Investigation of an oblique shock wave/laminar boundary layer interaction using Laser Doppler Velocimetry (LDV)
[VKI-TN-152] N86-17680

SHOCK WAVE PROFILES
Results for analytical transonic flow patterns with weak shock waves over curved walls with a corner
[STN-9] N86-17319

SHOCK WAVE PROPAGATION
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672

SHOCK WAVES
Shock response spectrum at low frequencies
[DE85-018273] N86-17797

SHORELINES
Tsunamis in Peru-Chile
[PB85-247815] N86-17973

SHORT CIRCUIT CURRENTS
Superlattices and multilayer structures for high efficiency solar cells N86-17850

SHORT CIRCUITS
Calculation methods for short-circuit currents in three-phase bridge rectifier circuits N86-17444

SHUTTLE DERIVED VEHICLES
Shuttle derived unmanned launch vehicle N86-17403

SHUTTLE IMAGING RADAR
The 1984 L-band radar experiment. Part 1: Ground truth Flevo (Netherlands) 1984 --- SIR-B N86-17609

SIGNAL ANALYSIS
A new small signal ac analysis tool for space power systems N86-17443

SIGNAL DETECTION
Direction of arrival estimation of eigenstructure methods with unknown sensor gain and phase
[AD-A160027] N86-18065

SIGNAL DETECTORS
Recirculating cross-correlation detector
[DE85-017782] N86-17709
The Norwegian Seismic Array (NORSAR)
[AD-A159820] N86-17933

SIGNAL ENCODING
Low cost voice compression for mobile digital radios
[NASA-CR-176490] N86-17594
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598
Contributions to combination coding: Sum ordering and covering radius
[ENST-85E002] N86-17600
The power spectral density of the HDB2 and the HDB3 coded signals
[FI-44-TBR-96] N86-17608
A systolic array implementation of a Reed-Solomon encoder and decoder
[AD-A159824] N86-18011

SIGNAL PROCESSING
Calculating radar detection probabilities by contour integration N86-17590
Analogue SAR signal processing: Architecture and technology
[REPT-3881-ISSUE-1-VOL-2] N86-17601
Integrated optoelectronic circuits and their modular designs for residue number computation N86-17614
One-channel adaptive antenna for troposhere microwave relay lines N86-17642
Multichannel commutators of analog signals for measurement of energy distribution over beam cross section of pulse laser N86-17644
The application of optimal control methods to the deconvolution of velocity meter signals
[ISVR-TR-128] N86-17717

SIGNAL TRANSMISSION
Area coverage of radio networks: Method description and propagation measurements in urban area
[FOA-C-30397-E2] N86-17612
Applications of fiber optic couplers to diagnostic experiments at the Nevada Test Site
[DE85-016787] N86-18161

SILANES
A method of fabricating silicon carbide mouldings
[BLL-RISLEY-TR-5206-(9091.9F)] N86-17747

SILICON
Photodecomposition of Mo(CO)6 adsorbed on Si(100)
[DE85-017818] N86-17510
Development of sensors on the basis of polycrystalline silicon
[BMFT-FB-T-85-068] N86-17720
Overview of SERI's high efficiency solar cell research N86-17841
Further research on high open circuit voltage in silicon solar cells N86-17842
GaAsP on GaP top solar cells N86-17847
Burst annealing of electron damage in silicon solar cells N86-17853
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862
Cell Research and Technology Workshop N86-17870
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880
Amorphous silicon solar cells, phase 2
[BMFT-FB-T-85-084] N86-17891
Development of thin-film solar cells based on amorphous silicon
[BMFT-FB-T-85-096] N86-17893
Narrow band gap amorphous silicon semiconductors
[DE85-017753] N86-18218

SILICON CARBIDES
A method of fabricating silicon carbide mouldings
[BLL-RISLEY-TR-5206-(9091.9F)] N86-17747

SILICON COMPOUNDS
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472

SILICON NITRIDES
Development of silicon nitride materials for casting of solar cell silicon
[BMFT-FB-T-85-069] N86-17577
Analysis of dielectric layers for Very Large Scale Integration (VLSI) applications, especially the influence of stoichiometry and hydrogen content on the properties of plasma nitride layers
[BMFT-FB-T-85-059] N86-17635

SILVER
Determination of the susceptibility of silver-plated copper wire/cable to red plague corrosion
[ESA-PSS-01-720-ISSUE-1] N86-17554
Microbial problem with storage of jet fuel in rock caverns: Development of a process for purification of corrosive jet fuel --- based on the use of powdered silver
[FOA-A-40051-B4] N86-17579

SILVER COMPOUNDS
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
SILVER HYDROGEN BATTERIES
Improved separators for silver-hydrogen cells
[AERE-R-11513] N86-17633
SIMULATION
A basic computer code for industrial burner designs. Part 1: Capability test in isothermal swirling flows N86-17284
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672
Thermal stratification in direct gain passive heating systems with variable heating of the floor and one vertical wall
[DE85-016860] N86-17677
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
SIMULATORS
Electromagnetic pulse (EMP): Exposure of missile 56 in EMP simulator sapiens
[FOA-C-30398-A3] N86-17605
SAPIENS memo 9: The dependance of the electric field on the inductance of the termination --- of an electromagnetic pulse (EMP) simulator
[FOA-C-30399-A3] N86-17606
SINGLE CRYSTALS
Internal friction study of strain aging in alloys
[DE85-018367] N86-17543
Overview of SERI's high efficiency solar cell research N86-17841
SINTERING
Heavy metal alloys containing 30% to 90% tungsten
[DE85-017896] N86-17546
High-field ZnO varistors: microstructures and properties
[DE85-018136] N86-17626
SITE SELECTION
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937
Northeastern regional geologic characterization report. Volume 3: Plates
[DE86-000418] N86-17938
SLABS
Response of viscoelastic slab to viscous slab to viscous fluid flow N86-17657
SLAGS
Rocket motor slag formation. Effects of internal flow field and propellant grain configuration N86-17414
SLIDING FRICTION
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
SLIP CASTING
Development of silicon nitride materials for casting of solar cell silicon
[BMFT-FB-T-85-069] N86-17577
SLOTS
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
SMOG
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
SMOKE
A smoke generator for the absolute calibration of gas turbine engine smoke sampling and measuring systems
[RAE-TM-P-1044] N86-17702
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981
Photosimulation of target acquisition in the presence of smoke: A pilot study
[IZF-1984-36] N86-17986
The Smoke Transmission and Reflection Threshold (START) model; the Oidebroek (Netherlands) 2 trials, May 1981
[IZF-1984-22] N86-18187
SODAR
A method for estimating atmospheric stability using sodar measurements --- in diffusion control at nuclear power plants
[FOA-E-40020] N86-17944
SODIUM
Continuous measurement of sodium aerosols in the air N86-17894
Investigations of the interaction between Na(3P) and K(4S) using measurements of the differential scattering cross section
[MPIS-7/1985] N86-18162
SODIUM CHLORIDES
Localized electrochemical corrosion of nickel based alloys
[DE86-000521] N86-17545
SODIUM HYDROXIDES
Influence of catalytic additions on ferric-oxide reduction
[BLL-BISI-23009-(9022.060)] N86-17526
SOFTENING
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548
SOFTWARE ENGINEERING
Software quality metrics of the Faint Object Camera (FOC) image processing software
[ESA-CR(P)-2039] N86-17716
Algebraic definition of a simple programming language
[CWI-CS-R8504] N86-18033
Subroutine package for Bessel functions of a complex argument and nonnegative order
[DE86-000047] N86-18071
Methods for Designing Software to Fit Human Needs and Capabilities. Proceedings of the Workshop on Software Human Factors
[AD-A156647] N86-18242
SOFTWARE TOOLS
A new approach to the design and construction of protocol testers --- X25 protocol
[NPL-DITC-54/85] N86-18006
The scenario test driver for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-55/85] N86-18044
Implementation assessment of the OSI network service. The test responder specification --- Open Systems Interconnection (OSI)
[NPL-DITC-56/85] N86-18045
Subroutine package for Bessel functions of a complex argument and nonnegative order
[DE86-000047] N86-18071
SOIL MECHANICS
Activities report of the Department of Engineering N86-18255
SOILS
Analysis of simultaneous heat and mass transfer in soils below solar ponds
[DE85-012163] N86-17877
Effects of acid rain on forest nutrient status
[DE85-018120] N86-17911
SOL-GEL PROCESSES
Ceramic composites made by sol-gel processing
[SNIAS-852-430-103] N86-17491
Amorphous aluminum hydroxide gels
[SNIAS-852-430-104] N86-17561
Gelation of aluminum hydroxide sols
[SNIAS-852-430-19] N86-17562
SOLAR ACTIVITY
Proceedings of the 19th Finnish Astronomers' Days
[REPT-S-162] N86-18258
Results of solar research studies at the Metsaehovi (Finland) radio research station N86-18260
SOLAR ARRAYS
Multiprimary winding inverter with low harmonic content N86-17439
Photovoltaic array simulation N86-17449
A computer analysis tool for evaluation of solar array design N86-17468
Space Photovoltaic Research and Technology 1985: High Efficiency, Space Environment, and Array Technology
[NASA-CP-2408] N86-17839
Interplanetary exploration-A challenge for photovoltaics N86-17861
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862
PASP: A high voltage array experiment N86-17863
Power requirements for commercial communications spacecraft N86-17868
Array technology and applications N86-17872
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876
Photovoltaic array performance simulation models
[DE85-016542] N86-17878
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236
SOLAR CELLS
Investigation of electrochemical corrosion of semiconductors
[DE85-016853] N86-17541
Development of silicon nitride materials for casting of solar cell silicon
[BMFT-FB-T-85-069] N86-17577
Space Photovoltaic Research and Technology 1985: High Efficiency, Space Environment, and Array Technology
[NASA-CP-2408] N86-17839
Overview of SERI's high efficiency solar cell research N86-17841
Further research on high open circuit voltage in silicon solar cells N86-17842
Gallium arsenide solar cell efficiency: Problems and potential N86-17843
N/P GaAs concentrator solar cells with an improved grid and bushbar contact design N86-17844
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
GaAsP on GaP top solar cells N86-17847
Vacuum MOCVD fabrication of high efficience cells N86-17848
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
Superlattices and multilayer structures for high efficiency solar cells N86-17850
A possible radiation-resistant solar cell geometry using superlattices N86-17851
Experience with OMCVD production of GaAs solar cells N86-17852
Burst annealing of electron damage in silicon solar cells N86-17853
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Radiation damage in high-resistivity silicon solar cells N86-17856
Photon radiation effects on CdS/CuInSe2 thin film solar cells N86-17857
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858
Depletion layer recombination effects on the radiation damage hardness of gallium arsenide cells N86-17859
Performance of Hughes GaAs concentrator cells under 1-MeV electron irradiation N86-17860
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862
Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864
Thermal stress cycling of GaAs solar cells N86-17865
Demonstrated results of welded and soldered interconnections N86-17866
Thin film coatings for improved alpha/epi N86-17867
Cell Research and Technology Workshop N86-17870
Space Environment Workshop N86-17871
Array technology and applications N86-17872
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880
Laser-assisted solar cell metallization processing
[NASA-CR-176457] N86-17883
Amorphous silicon solar cells, phase 2
[BMFT-FB-T-85-084] N86-17891
Development of thin-film solar cells based on amorphous silicon
[BMFT-FB-T-85-096] N86-17893
Process for selectively patterning epitaxial film growth on a semiconductor substrate
[DE85-017733] N86-18216
SOLAR COLLECTORS
Solar thermal rocket design and fabrication N86-17428
N/P GaAs concentrator solar cells with an improved grid and bushbar contact design N86-17844
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
Performance of Hughes GaAs concentrator cells under 1-MeV electron irradiation N86-17860
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862

Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876

SOLAR CYCLES
Analysis of the solar powered/fuel assisted Rankine cycle cooling system. Phase 1: Revision
[DE85-016173] N86-17675

SOLAR ELECTRIC PROPULSION
Microwave electric propulsion for orbit transfer applications N86-17429

SOLAR ENERGY
Vapor compression heat pump system field tests at the TECH complex
[DE85-016364] N86-17670

SOLAR ENERGY CONVERSION
N/P GaAs concentrator solar cells with an improved grid and bushbar contact design N86-17844
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875

SOLAR FLUX
Total normal emittance measurements of highly conductive, opaque materials using a solar furnace
[DE85-016578] N86-17508

SOLAR FURNACES
Total normal emittance measurements of highly conductive, opaque materials using a solar furnace
[DE85-016578] N86-17508

SOLAR GENERATORS
Cell Research and Technology Workshop N86-17870
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876
Numerical study of the performance of latent heat storage for solar dynamic power systems
[DE85-018101] N86-17884
Test and operation program STEP 100 (German-Australian solar power plant in Meekatharra, Western Australia)
[BMFT-FB-T-85-077] N86-17887
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236

SOLAR OSCILLATIONS
Solar 160 min oscillation at microwave N86-18261

SOLAR PHYSICS
Cyclic mean flows in the Sun as a probe of the dynamo action N86-18259

SOLAR PONDS (HEAT STORAGE)
Analysis of simultaneous heat and mass transfer in soils below solar ponds
[DE85-012163] N86-17877

SOLAR POWER SATELLITES
Power requirements for commercial communications spacecraft N86-17868

SOLAR RADIATION
Solar thermal propulsion for planetary spacecraft N86-17423
Solar thermal rocket design and fabrication N86-17428
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236

SOLAR REFLECTORS
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875

SOLAR TERRESTRIAL INTERACTIONS
National Geophysical Data Center
[PB85-248458] N86-17947
Solar wind control of the polar cusp
[DMI-GEOPHYS-PAPERS-B-72] N86-18283

SOLAR THERMAL PROPULSION
Solar thermal propulsion for planetary spacecraft N86-17423
Solar thermal rocket design and fabrication N86-17428

SOLAR WIND
Solar wind control of the polar cusp
[DMI-GEOPHYS-PAPERS-B-72] N86-18283

SOLDERED JOINTS
Demonstrated results of welded and soldered interconnections N86-17866

SOLENOIDS
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114

SOLID ELECTRODES
Improvement of the process for electrochemical impregnation of nickel hydroxide electrodes --- nickel cadmium batteries N86-17447

SOLID PROPELLANT COMBUSTION
Moonburner: An ultra-high web fraction grain design N86-17392
The 2.75 minimum signature barrage rocket N86-17393

SOLID PROPELLANT ROCKET ENGINES
The 1985 JANNAF Propulsion Meeting, volume 1
[AD-A161084] N86-17380
Determining behavior of solid rocket motor internal components using dynamic real-time radiography N86-17382
Cracked ballistic grain tests and analysis N86-17383
Elastomeric Barrier Pulse Motors N86-17385
Bouyant flow and its effect on internal insulation performance: Numerical approach N86-17388
Factors affecting Pi sub k in HTPB formulations N86-17390
Moonburner: An ultra-high web fraction grain design N86-17392
The 2.75 minimum signature barrage rocket N86-17393
Use of peel values in structural analysis N86-17394
Improved space motor demonstration N86-17413
Rocket motor slag formation. Effects of internal flow field and propellant grain configuration N86-17414

SOLID ROCKET PROPELLANTS
The 1985 JANNAF Propulsion Meeting, volume 1
[AD-A161084] N86-17380
Systems analysis of solid fuel nuclear engines in cislunar space
[ILR-MITT-142] N86-18171

SOLID STATE
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
Detailed design of a 13 kA 13 kV dc solid-state turn-off-switch
[DE85-013874] N86-17623

SOLID STATE LASERS
Development of solid state vibrational lasers
[AD-A159817] N86-17732
TECATE: A code for anisotropic thermoelasticity in high-average-power laser technology, phase 1
[DE85-016067] N86-17736

SOLIDIFICATION
Shape and depth of the crystallisation front in steel ingots remelted by the electroslag method determined with the aid of radioactive phosphorus
[BLL-DRIC-T-TR-7561-(3623.66)] N86-17525

SOLIDS
Diffusional creep of multicomponent systems
[DE86-000184] N86-17549
Fluidizing device for solid particulates
[DE85-006504] N86-17752

SOLVENTS
The role of solvent reorganization dynamics in electron-transfer processes. Theory-experiment comparisons for electrochemical and homogeneous electron exchange involving metallocene redox couples
[AD-A160034] N86-17504
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981

SONAR
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704

SOUND TRANSMISSION
Stochastic measurements and systems implications
[AD-A159827] N86-18122

SOUND WAVES
Effect of charge and aerodynamic properties of particles on electrified fabric filtration
[DE86-000013] N86-17628
Effects of strong diffraction on the focusing and scattering of acoustic waves N86-18120

SOUNDING ROCKETS
Utilization of the Swedish experiment module within the TEXUS 9/10 flight opportunity
[M5/7-14] N86-17363

SOUTH CAROLINA
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822

SPACE CHARGE
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854

SPACE COOLING (BUILDINGS)
Vapor compression heat pump system field tests at the TECH complex
[DE85-016364] N86-17670

SPACE ENVIRONMENT SIMULATION
Photovoltaic array simulation N86-17449
Analysis in simulated space environment of composite material behavior
[SNIAS-852-430-116] N86-17495

SPACE FLIGHT
Computer simulation of environmental, hazard scenarios in space N86-17411

SPACE HEATING (BUILDINGS)
Vapor compression heat pump system field tests at the TECH complex
[DE85-016364] N86-17670

SPACE PLASMAS
The hot plasma spectrometers on Viking
[KGI-PREPRINT-077] N86-17377
Waves with harmonic structure below and above the Lower Hybrid Resonance (LHR) observed on the Cleft Energetics Transport and Ultraviolet Radiation (CENTAUR) 35.001 and 35.002 rockets
[DRI-2-85] N86-17946
Activities report in geophysics
[UIO-SR-85-01] N86-18203

SPACE SHUTTLE PAYLOADS
Results of space shuttle flight 51-A
[GPO-44-770] N86-17367

SPACE SHUTTLES
Development of computational fluid dynamics at NASA Ames Research Center N86-17275
Results of space shuttle flight 51-A
[GPO-44-770] N86-17367
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405

SPACE STATIONS
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270
Space Station Engineering and Technology Development. Proceedings of the Panel on Program Performance and Onboard Mission Control
[NASA-CR-176484] N86-17372
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405
Space station advanced propulsion and fluid management program N86-17420
Space station propulsion approaches and technology status N86-17421
Alternating currrent buses for low Earth orbits: A viable alternative N86-17435

SPACE SURVEILLANCE (SPACEBORNE)
Future Air Force space power needs N86-17840

SPACE TRANSPORTATION
Regulatory aspects of commercial, space transportation N86-17409

SPACE TRANSPORTATION SYSTEM
Results of space shuttle flight 51-A
[GPO-44-770] N86-17367
Shuttle derived unmanned launch vehicle N86-17403

SPACEBORNE ASTRONOMY
Ad astra HIPPARCOS. The European Space Agency's astrometry mission
[ESA-BR-24] N86-18282

SPACEBORNE EXPERIMENTS
Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864

SPACECRAFT ANTENNAS
MMIC antenna technology development in the 30/20 gigahertz band
[NASA-TM-87192] N86-17368

SPACECRAFT CHARGING
Surface potential monitor --- spacecraft surfaces
[SEP-TS/SE/RE/10418/84] N86-17378
Discharge detection in high voltage flight hardware N86-17457

SPACECRAFT COMMUNICATION
MMIC antenna technology development in the 30/20 gigahertz band
[NASA-TM-87192] N86-17368
Validation of a software package for communication systems analysis and design: The TOPSIM 3 software
[ESA-CR(P)-2075] N86-18029

SPACECRAFT COMPONENTS
Shuttle derived unmanned launch vehicle N86-17403
Discharge detection in high voltage flight hardware N86-17457
Design and development of a pyrotechnique arming and firing unit --- spacecraft pyrotechnics N86-17465
Fatigue performance of prestressed composite pressure vessels
[SNIAS-852-430-114] N86-17494
The ESA preferred parts list
[ESA-PSS-01-603] N86-17634
High pressure gas storage tanks: A compromise between safety regulations and performances
[SNIAS-852-430-115] N86-17768

SPACECRAFT CONFIGURATIONS
Shuttle derived unmanned launch vehicle N86-17403
SPACECRAFT CONSTRUCTION MATERIALS
Measurement of thermo-optical properties of thermal control materials
[ESA-PSS-01-709-ISSUE-1] N86-17375
SPACECRAFT DESIGN
An interactive design system for winged space vehicle N86-17269
Orbital transfer vehicle engine integration study N86-17416
Design optimization for a space based, reusable orbit transfer vehicle N86-17418
A review of space-related thermophysical research at NLR
[NLR-MP-84063-U] N86-18256
SPACECRAFT ELECTRONIC EQUIPMENT
The ESA preferred parts list
[ESA-PSS-01-603] N86-17634
SPACECRAFT MODELS
Towards digital computer simulation of the dynamics of flexible spacecraft
[NLR-TR-83106-U] N86-17376
SPACECRAFT POWER SUPPLIES
Space station propulsion approaches and technology status N86-17421
Solar thermal propulsion for planetary spacecraft N86-17423
Thermal arcjet technology for space propulsion N86-17427
Proceedings of ESA sessions at the 16th IEEE Annual Power Electronics Specialists Conference --- spacecraft power supplies
[ESA-SP-230] N86-17432
MARECS and ECS: The first few years in orbit --- power subsystems N86-17433
The Telecom 1 power subsystem from design to flight N86-17434
Alternating current buses for low Earth orbits: A viable alternative N86-17435
The Giotto power supply subsystem N86-17436
The ERS-1 power system N86-17437
Multiprimary winding inverter with low harmonic content N86-17439
A synchronized dc/dc converter for the data telemetry system of INTELSAT 6 N86-17440
Analysis of a particular working mode of S3R type regulator --- telecommunication satellites N86-17441
Spacecraft Orbital Power Evaluation (SCOPE) N86-17442
A new small signal ac analysis tool for space power systems N86-17443
Temperature derivative battery charge control N86-17445
Use of impedance measurements to model nickel-cadmium batteries N86-17446
The results of some end of life tests on the OTS battery N86-17448
An alternative for satellite power distribution N86-17450
The 230W Traveling Wave Tube Amplifier (TWTA) power supply design --- Olympus television satellite N86-17453
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder --- Olympus television satellite N86-17454
Application of current-control modulator (MC2) control feedback for 12 GHz 20 W Electric Power Conditioner (EPC) for Telecom satellite N86-17455
Design of high-voltage, high-power, solid state remote power controllers for aerospace applications N86-17456
Exact continuous models of Pulse Width Modulation (PWM) regulators in both continuous and discontinuous conduction modes --- spacecraft power supplies N86-17459
Power switching cell modeling: An easy way --- spacecraft power supplies N86-17460
Modeling and implementation of a digitally controlled power converter using duty ratio quantization --- spacecraft power supplies N86-17461
Improving the response time of a switching regulator using SENSIT and DESIGN/ASTAP --- spacecraft power supplies N86-17462
Design and development of a current limited solid state hybrid switch --- spacecraft power supplies N86-17464
Influence of the bus regulation on telecommunication spacecraft power system and distribution N86-17467
MATPWR: A mission analysis tool for LEO spacecraft power profiles computation N86-17469
Space Photovoltaic Research and Technology 1985: High Efficiency, Space Environment, and Array Technology
[NASA-CP-2408] N86-17839
Future Air Force space power needs N86-17840
N/P GaAs concentrator solar cells with an improved grid and bushbar contact design N86-17844
Experience with OMCVD production of GaAs solar cells N86-17852
Performance of Hughes GaAs concentrator cells under 1-MeV electron irradiation N86-17860
Power requirements for commercial communications spacecraft N86-17868
Space station power management and distribution N86-17869
Space Environment Workshop N86-17871
Numerical study of the performance of latent heat storage for solar dynamic power systems
[DE85-018101] N86-17884
SPACECRAFT PROPULSION
The 1985 JANNAF Propulsion Meeting, volume 1
[AD-A161084] N86-17380
Cyclic structural analyses of anisotropic turbine blades for reusable space propulsion systems N86-17404
IUS propulsion status N86-17415
SPACELAB PAYLOADS
Bio-Observation Subsystem (BOSS) feasibility study --- Spacelab
[BOSS-010-MT] N86-17362
Bio-observation subsystem, phase A study, executive summary --- Spacelab
[REPT-648-DT-6-ISSUE-1] N86-17364
Preparation of the helium-cooled German Infrared Laboratory (GIRL) interferometer for scientific use on Spacelab
[MPE-192] N86-17721
SPARK CHAMBERS
Position sensitive gas counter readout system
[DE85-017953] N86-17713
SPATIAL DISTRIBUTION
Acid Deposition System (ADS) data base, data summary procedures and statistical reporting of spatial patterns and trends
[DE85-017910] N86-17907
SPECIFIC IMPULSE
Thermal arcjet technology for space propulsion N86-17427
SPECIFICATIONS
Introduction to deployable recovery systems
[DE86-000048] N86-17310
Algebraic definition of a simple programming language
[CWI-CS-R8504] N86-18033
The efficiency of the Equation Interpreter compared with the University of New Hampshire (UNH) Prolog interpreter
[CWI-CS-R8509] N86-18035
Implementation assessment of the OSI network service. The test responder specification --- Open Systems Interconnection (OSI)
[NPL-DITC-56/85] N86-18045
SPECIMEN GEOMETRY
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477
SPECTRAL EMISSION
Generation of magnetospheric radiation by decay of Bernstein waves
[KGI-PREPRINT-076] N86-17942
SPECTRAL ENERGY DISTRIBUTION
On the prediction and the spectral factorization of stationary processes in the broad sense with two discrete parameters
[ENST-85C002] N86-18074
SPECTRAL REFLECTANCE
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728
SPECTRAL SENSITIVITY
Improved blue response CCD-MA357 detectors --- spaceborne imaging
[GEC-16,879C] N86-17718
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100
SPECTRAL THEORY
Nonlinear evolution equations associated with the chiral field spectral problem
[PREPRINT-455] N86-18112
SPECTROMETERS
The hot plasma spectrometers on Viking
[KGI-PREPRINT-077] N86-17377
Position sensitive gas counter readout system
[DE85-017953] N86-17713
Large magnetic spectrometer group
[DE85-017512] N86-18154
SPECTROPHOTOMETERS
Improved fiberoptic spectrophotometer
[DE85-017792] N86-17710
SPECTRORADIOMETERS
Spectroradiometric calibration of the Thematic Mapper and multispectral scanner system
[E86-10022] N86-17816
SPECTROSCOPY
Rare earth chemical and physical metallurgy
[DE85-015536] N86-17537
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858
SPECTRUM ANALYSIS
Spectral analysis and metallographic investigations of corrosion and precipitation products of high temperature alloys
[JUEL-1975] N86-17553
A study of continuous wave lasing and modelocking in a neodymium-phosphate glass crystal N86-17729
Structural responses in a random environment --- mechanical or acoustical excitation
[CNES-NT-115] N86-17800
Scattering of an acoustic field by a nonhomogeneous nonuniform flow
[ONERA-P-1985-1] N86-18127
SPEECH
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598
SPEECH BASEBAND COMPRESSION
Low cost voice compression for mobile digital radios
[NASA-CR-176490] N86-17594
SPEECH RECOGNITION
Visualisations of speech based on a model of the peripheral auditory system
[NPL-DITC-62/85] N86-17593
Speech processing for intelligibility improvement
[IZF-1985-14] N86-17610
SPHERES
Thermal transport, mass-ablation and preheat in laser-target experiments
[DE85-017584] N86-17742
SPHERICAL COORDINATES
Waveform vector quantization: The algebraic approach
[ENST-85C004] N86-18096
SPHEROMAKS
Maryland controlled fusion research program. Volume 1
[DE85-018027] N86-18197
SPIN RESONANCE
Resonance production in gamma gamma collisions 2
[NIKHEF-H/85-2] N86-17890
SPIRAL ANTENNAS
A study of the spiraphase and anisotropic substrates in microstrip antennas
[AD-A159862] N86-17597
SPIRAL GALAXIES
How do galaxies make spiral arms: Stochastic versus gravitational N86-18262
SPLINE FUNCTIONS
Three-dimensional flight-path reconstruction by means of spline approximation
[NLR-TR-83091-U] N86-17347
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060
SPLITTING
Applications of fiber optic couplers to diagnostic experiments at the Nevada Test Site
[DE85-016787] N86-18181
SPOILERS
Application of computational aerodynamics to wing design N86-17297
SPRAYED COATINGS
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879
SPUTTERING
Laser spectroscopy of sputtered atoms
[DE85-018388] N86-17517
Sputter deposition system for controlled fabrication of multilayers
[DE85-017521] N86-17582
STABILITY
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304
Damage-rate gradient effects on radiation-induced segregation and phase stability in irradiated alloys
[DE85-016605] N86-17540
Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects
[NASA-TM-87207] N86-17789
STAINLESS STEELS
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387

The effects of surface pretreatment and nitrogen tetroxide purification on the corrosion rate of Type 304L stainless steel N86-17396
Stress corrosion cracking of 316 stainless steel in high temperature water
[BR94397] N86-17529
Survey of physical property data for several alloys
[DE85-018138] N86-17542
Influence of corrosion pits and environmental moisture on the fatigue behavior of 35 NCD 16 THR-ESR
[M3-450900] N86-17555
Chemical and microstructural effects on the diffusional creep behaviour of AISI type 316 stainless steel
[AERE-R-11322] N86-17563
Corrosion of materials in absorption heating and refrigeration fluids
[DE85-018140] N86-17585
Vacuum arc remelting: An overview
[DE85-016458] N86-17751
Multi-port valve assembly
[DE85-017769] N86-17753
Fatigue in a welded join made by pulsed MIG welding of a 304 type stainless steel
[BLL-RISLEY-TR-5233-(9091.9F)] N86-17783
Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799

STAMPING
Applications of microalloyed steels to stamping
[CETIM-13-K-301] N86-17557

STANDARD DEVIATION
Statistics on the basic characteristics of carbon epoxy composites
[DGT-27.039] N86-17487

STANDARDIZATION
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 1: Background and fatigue evaluation
[RAE-TR-84084] N86-17336
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 2: Final definition of Helix and Felix
[RAE-TR-84085] N86-17337
Technical overview of the information resource dictionary system
[PB85-224491] N86-18004

STANDARDS
Environment-friendly propeller aircraft with a maximum weight of 5700 kg, and motor gliders: Publication of the noise values N86-17341
The Physikalisch-Technische Bundesanstalt (PTB) test regulations. Immunity from disturbance. Methods to test the influence of electromagnetic disturbances on measuring equipment
[ISSN-0341-7964] N86-17592
Technical overview of the information resource dictionary system
[PB85-224491] N86-18004

STARS
Nuclear astrophysics away from stability
[DE85-018188] N86-18281

STATIC ELECTRICITY
Theoretical investigations of metal surfaces N86-18206

STATIC FIRING
The 2.75 minimum signature barrage rocket N86-17393

STATIC INVERTERS
Multiprimary winding inverter with low harmonic content N86-17439
A synchronized dc/dc converter for the data telemetry system of INTELSAT 6 N86-17440

STATIC LOADS
The effect of blunt notches and saw cuts on the static strength of 2024-T3 and 7075-T6 sheet material --- aluminum alloys
[VTH-LR-313] N86-17807

STATIC PRESSURE
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282

STATIC TESTS
Lecture notes on fatigue, static tensile strength and stress corrosion of aircraft materials and structures. Part 2: Figures
[VTH-LR-360-PT-2] N86-17345
Static and fatigue strength of explosion welded plates
[BLL-RISLEY-TR-5232-(9091.9F)] N86-17784

STATIONKEEPING
Bipropellant Earth storable rocket engines for satellites: A 1985 update N86-17398

STATISTICAL ANALYSIS
Activities report for the West German Civil Airports. Part 1: Text
[ISBN-3-87977-056-5-PT-1] N86-17326
Activities report for the West German civil airports. Part 2: Tables
[ISBN-3-87977-056-5-PT-2] N86-17327
Structural responses in a random environment --- mechanical or acoustical excitation
[CNES-NT-115] N86-17800
Revised Uniform Summary of Surface Weather Observations, Pease AFB, New Hampshire
[AD-A159865] N86-17954
Estimation of sea-surface windspeed from whitecap cover: Statistical approaches compared empirically and by simulation
[AD-A159816] N86-17969
Random parameter Markov population process models and their likelihood, bayes and empirical bayes analysis
[AD-A159812] N86-18102
How many bootstraps?
[AD-A160043] N86-18106

STATISTICAL DISTRIBUTIONS
On the prediction and the spectral factorization of stationary processes in the broad sense with two discrete parameters
[ENST-85C002] N86-18074

STATISTICAL MECHANICS
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109
Thermodynamic properties and microscopic structure of fluids and fluid mixtures
[DE85-016482] N86-18234

STATISTICAL TESTS
Power series approximations to the null distributions of some Chi-Bar-Square statistics
[AD-A159785] N86-18101

STATISTICAL WEATHER FORECASTING
Revised Uniform Summary of Surface Weather Observations, Sparrevohn AFS, Alaska
[AD-A159864] N86-17953
Revised Uniform Summary of Surface Weather Observations, Pease AFB, New Hampshire
[AD-A159865] N86-17954

STATORS
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
Determining spatial orientation of axes of elliptical magnetic field N86-17652

STEADY FLOW
The steady lifting surface theory with a free-surface --- hydrodynamic forces
[ONERA-P-1984-2] N86-17684
Atmospheric boundary layer modeling N86-17896

STEADY STATE
Limitations in variable conductance heat pipe performance and control predicted by the current steady-state model developed at NLR
[NLR-MP-84009-U] N86-17695

STEAM
Condensation of the underside of a horizontal surface in a closed vessel
[DE85-018379] N86-17674

STEAM TURBINES
Analysis of the solar powered/fuel assisted Rankine cycle cooling system. Phase 1: Revision
[DE85-016173] N86-17675

STEELS
Influence of boron on dendrite structure of cast metal
[BLL-M-36491-(5828.4)] N86-17523
Shape and depth of the crystallisation front in steel ingots remelted by the electroslag method determined with the aid of radioactive phosphorus
[BLL-DRIC-T-TR-7561-(3623.66)] N86-17525
Development of a single phase surface layer of TiN on steel
[REPT-1570] N86-17550
Study of the surface heat treatment of cutting tools and samples of grooved cylinders made by a laser beam. Comparison with an electron beam
[REPT-1578] N86-17551
Applications of microalloyed steels to stamping
[CETIM-13-K-301] N86-17557
Influence of the present practice of heat straightening of thick steel plates (over 20 mm) on the mechanical properties
[CETIM-100-840] N86-17560
Development of a manufacturing procedure to produce cold rolling cylinders by deposing a high alloy steel layer on a normal steel cylinder
[REPT-1645] N86-17586
High speed steel working tools --- milling
[CETIM-102360] N86-17762
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769

STELLAR EVOLUTION
Optical and infrared photometry of southern early-type shell stars and pre-main-sequence variables N86-18274
CCD photometry of galactic clusters containing Cepheid variables. Paper 3: Photometry and identification charts for NGC 6067 N86-18276

STELLAR MODELS
Nuclear astrophysics away from stability
[DE85-018188] N86-18281

STELLARATORS
Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device
[DE85-018139] N86-18190
Experimental studies of radio frequency waves and confinement in the Auburn Torsatron
[DE85-017189] N86-18199

STIFFENING
Design of hat-stiffened composite panels under uniaxial compression and shear. Minimum mass optimization based on a simplified theory
[VTH-LR-312] N86-17806
Residual strength of bonded stiffened panels: Prediction and experimental verification
[NLR-TR-83066-U] N86-17808

STIRLING CYCLE
Breadboard development of a hydraulically coupled free piston engine heat pump compressor
[DE85-005242] N86-17874
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876

STOCHASTIC PROCESSES
Lagrangian modeling of turbulent dispersion --- air pollution N86-17901
Performance and reliability analysis using directed acyclic graphs
[AD-A160313] N86-18016
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100
Brownian motion
[AD-A160020] N86-18103
Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device
[DE85-018139] N86-18190
How do galaxies make spiral arms: Stochastic versus gravitational N86-18262

STOICHIOMETRY
Analysis of dielectric layers for Very Large Scale Integration (VLSI) applications, especially the influence of stoichiometry and hydrogen content on the properties of plasma nitride layers
[BMFT-FB-T-85-059] N86-17635

STORABLE PROPELLANTS
Bipropellant Earth storable rocket engines for satellites: A 1985 update N86-17398
Space station advanced propulsion and fluid management program N86-17420

STORAGE RINGS (PARTICLE ACCELERATORS)
Collective effects and lattice implications for an FEL bypass ring
[DE85-016563] N86-17735
New results on Bhabha scattering at 29 GV
[DE85-018406] N86-18146
Proposals for synchrotron light sources
[DE85-017444] N86-18168
Three dimensional toroidal magnetohydrodynamic particle code
[DE86-000239] N86-18202

STORMS (METEOROLOGY)
Natural Phenomena Hazards Modeling Project. Extreme wind/tornado hazard models for Department of Energy sites. Revision 1
[DE85-018156] N86-17957

STRAIN HARDENING
Internal friction study of strain aging in alloys
[DE85-018367] N86-17543

STRAIN MEASUREMENT
Closure of fatigue cracks at high strains
[NASA-CR-175021] N86-17788

STRAIN RATE
Initial results for the failure strength of a LOVA gun propellant at high pressures and various strain rates N86-17402
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites
[OUEL-1578/85] N86-17480
The effect of quenching rate on the temperature and strain-rate sensitivity of uranium 2w/o molybdenum alloy
[OUEL-1577/85] N86-17528
High strain rate deformation in FCC metals and alloys
[DE85-017533] N86-17536
A pendulum impactor for measuring the resistance of materials to jerk strains
[FOA-C-20577-D4] N86-17725

High strain-rate properties of materials
[BR94080] N86-17785
Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 1: Kinematics of Basin-Range intraplate extension
[NASA-CR-176498] N86-17928
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 3: Kinematics of Great Basin intraplate extension from earthquake, geodetic and geologic information
[NASA-CR-176500] N86-17930

STRANGENESS
Treatment of strange particle decays observed in the UA5 streamer chambers
[USIP-85-16] N86-18175

STRAPDOWN INERTIAL GUIDANCE
Construction of a measuring method using fiber optics and an LTN-90 laser gyro strapdown system for BO-195 helicopters
[DFVLR-MITT-85-10] N86-17333

STRESS ANALYSIS
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
Vibrational stability behaviour of orthotropic plates in steel roads bridges: Application for financial support of a research project by the ECSC (European Coal and Steel Community)
[BLL-TRANS-3225-(9057.2451)] N86-17778
Crack growth in an elastic-primary creeping material N86-17779
The use of acoustical caustics in fracture mechanics N86-17781
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801
The effect of blunt notches and saw cuts on the static strength of 2024-T3 and 7075-T6 sheet material --- aluminum alloys
[VTH-LR-313] N86-17807

STRESS CORROSION
Lecture notes on fatigue, static tensile strength and stress corrosion of aircraft materials and structures. Part 2: Figures
[VTH-LR-360-PT-2] N86-17345

STRESS CORROSION CRACKING
Stress corrosion cracking of 316 stainless steel in high temperature water
[BR94397] N86-17529
Pressing effect and stress corrosion cracking of an extruded AlZnMgCu type aluminum alloy
[BMFT-FB-T-85-087] N86-17558
Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799

STRESS FUNCTIONS
The rotating disk and the yield conditions of Tresca and von Mises
[LAB-REPT-759] N86-17810

STRESS RELAXATION
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 1: Kinematics of Basin-Range intraplate extension
[NASA-CR-176498] N86-17928

STRESS-STRAIN RELATIONSHIPS
Cyclic structural analyses of anisotropic turbine blades for reusable space propulsion systems N86-17404

STRIP
Gated strip proportional detector
[DE85-017757] N86-17708

STRIP TRANSMISSION LINES
A study of the spiraphase and anisotropic substrates in microstrip antennas
[AD-A159862] N86-17597

STRONG INTERACTIONS (FIELD THEORY)
Quark dynamics of N anti N annihilation
[DE85-017508] N86-18153

STRONTIUM ISOTOPES
Difficulties with inferring neutron cross sections from charged-particle reactions
[DE86-000020] N86-18149

STRONTIUM 90
An intercomparison of measurements of the beta spectra of 90Sr-90Y
[NPL-RS(EXT)77] N86-18134

STRUCTURAL ANALYSIS
Strategies for dynamic modeling of a helicopter structure
[SNIAS-852-210-101] N86-17350
Use of peel values in structural analysis N86-17394
Cyclic structural analyses of anisotropic turbine blades for reusable space propulsion systems N86-17404
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures N86-17771
Publications, catalog 1985 N86-18249

STRUCTURAL DESIGN
Optimization in design processes: An informatics point of view
[NLR-MP-84074-U] N86-17349
Activities report of the Institute of Sound and Vibration Research N86-17685
Channel design for closed cycle MHD
[NLR-MP-84053-U] N86-18205

STRUCTURAL DESIGN CRITERIA
Damage-tolerant aircraft design
[NLR-MP-84005-U] N86-17342

STRUCTURAL ENGINEERING
Vibrational stability behaviour of orthotropic plates in steel roads bridges: Application for financial support of a research project by the ECSC (European Coal and Steel Community)
[BLL-TRANS-3225-(9057.2451)] N86-17778

STRUCTURAL MEMBERS
Rock failure criteria for design of underground structural supports
[AD-A159807] N86-17932

STRUCTURAL VIBRATION
Strategies for dynamic modeling of a helicopter structure
[SNIAS-852-210-101] N86-17350
Structural responses in a random environment --- mechanical or acoustical excitation
[CNES-NT-115] N86-17800

STYRENES
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501

SUBROUTINES
Subroutine package for Bessel functions of a complex argument and nonnegative order
[DE86-000047] N86-18071

SUBSONIC FLOW
Investigations on efficient numerical method for subsonic lifting surfaces N86-17285
Subsonic unsteady aeroelasticity: The potential method applied to lifting surfaces
[ONERA-RT-21/3064-RY-045-R] N86-17315
A survey of computational methods for subsonic and transonic aerodynamic design
[NLR-MP-84066-U] N86-17323

SUBSONIC SPEED
Estimation of sideforce, yawing moment and rolling moment derivatives due to rate of yaw for complete aircraft at subsonic speeds
[ESDU-84002] N86-17357

SUBSTITUTES
Enhancing the impact toughness of low alloy steel by micro-alloying and modification
[BLL-M-36490-(5828.4)] N86-17522

SUBSTRATES
Integrated optoelectronic circuits and their modular designs for residue number computation N86-17614
Overview of SERI's high efficiency solar cell research N86-17841
Further research on high open circuit voltage in silicon solar cells N86-17842
GaAsP on GaP top solar cells N86-17847
Vacuum MOCVD fabrication of high efficience cells N86-17848
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855
Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880
Process for selectively patterning epitaxial film growth on a semiconductor substrate
[DE85-017733] N86-18216

SUBSTRUCTURES
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548

SULFATES
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909
Oxygen-18 study of the atmospheric-aquatic linkage in three Adirondack lake watersheds
[DE85-018355] N86-17912

SULFIDES
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226

SULFONES
Dose of PES (plasticizer) in a BSL914 resin using different standards --- liquid chromatography
[CEAT-NT-15/M/85] N86-17521

SULFUR
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909
Deposition of sulfur in Europe: Methods to construct unbiased source-receptor matrices from data of a limited period (1976 - 1982). A meteorological contribution to the IIASA Regional Acidification Information and Simulation (RAINS) model
[KNMI-TR-86] N86-17923

SULFUR DIOXIDES
Influence of a large sulfur dioxide point source on mesoscale rainwater chemistry
[DE85-018215] N86-17908

SULFUR OXIDES
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913

SUMS
Contributions to combination coding: Sum ordering and covering radius
[ENST-85E002] N86-17600

SUPERCONDUCTING MAGNETS
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114

SUPERCONDUCTIVITY
Correlation and collective modes in narrow band materials
[AD-A160310] N86-18210
New example of superconducting walls in the ferromagnet ErRh4B4
[DE85-018398] N86-18224
Tricritical behavior in the ferromagnetic superconductor ErRh4B4
[DE85-018339] N86-18229

SUPERCRITICAL FLOW
The comparison of the transonic airfoil calculation by NSFOIL with the wind tunnel test data at high Reynolds number N86-17295

SUPERCRITICAL WINGS
Inverse method with geometry constraints for transonic airfoil design
[NLR-MP-84069-U] N86-17311
Transonic wind tunnel tests of a swept supercritical wing-body model, PT 8
[FFA-TN-1982-24] N86-17316

SUPERHIGH FREQUENCIES
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder --- Olympus television satellite N86-17454

SUPERLATTICES
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
Superlattices and multilayer structures for high efficiency solar cells N86-17850
A possible radiation-resistant solar cell geometry using superlattices N86-17851
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211

SUPERPOSITION (MATHEMATICS)
On-line superposition of geographical data to TIROS-N type meteorological satellite images
[NLR-TR-82133-U] N86-17962

SUPERSONIC FLOW
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
Supersonic flow on axisymmetric blunt body N86-17268
An experimental investigation of supersonic flow over axisymmetric afterbodies with a centered propulsive jet at angles of attack
[FFA-TN-1985-10] N86-17317
Investigation of an oblique shock wave/laminar boundary layer interaction using Laser Doppler Velocimetry (LDV)
[VKI-TN-152] N86-17680

SUPERSONIC FLUTTER
Estimation of divergence and flutter boundaries on supersonic plate wing models from subcritical random responses due to air turbulence
[NAL-TR-856] N86-17308

SUPERSONIC NOZZLES
Thrust vector technology demonstration N86-17384

SUPPORTS
Rock failure criteria for design of underground structural supports
[AD-A159807] N86-17932
SURFACE ACOUSTIC WAVE DEVICES
Application of surface acoustic wave resonators to quartz bending beams as integrated dilation recorders in balances (load cells)
[BMFT-FB-T-85-058] N86-17803
SURFACE DIFFUSION
Development of a single phase surface layer of TiN on steel
[REPT-1570] N86-17550
SURFACE FINISHING
Effect of carbon fiber surface treatment on moisture absorption and interlaminar shear strength of carbon fibre/epoxy resin composites
[RAE-TR-84047] N86-17474
Possibilities of protection from abrasive and adhesive wear
[BLL-RISLEY-TR-5166-(9091.9F)] N86-17744
Robotic deburring: A bibliography
[DE85-015760] N86-17750
Surface finish measurements of diamond-turned electroless-nickel-plated mirrors
[DE85-017833] N86-18185
SURFACE LAYERS
Development of a single phase surface layer of TiN on steel
[REPT-1570] N86-17550
Compositional variation in the near surface layers: An atom probe study of surface segregation in alloys N86-18207
SURFACE PROPERTIES
Modification of vulcanized elastomer surfaces to diminish adherence to metals
[CETIM-100340] N86-17575
Study of surface discharges
[ONERA-RF-10/7236-PY] N86-17639
SURFACE REACTIONS
Surface-enhanced raman spectroscopy as a probe of adsorbate-surface bonding: Simple alkenes and alkynes adsorbed at gold electrodes
[AD-A160033] N86-17503
SURFACE ROUGHNESS
Wind speed profiles over terrain with roughness changes for flat or hilly sites
[ESDU-84011-A] N86-17949
Surface finish measurements of diamond-turned electroless-nickel-plated mirrors
[DE85-017833] N86-18185
SURFACES
Investigations on efficient numerical method for subsonic lifting surfaces N86-17285
SURGERY
Excimer laser phototherapy for the dissolution of abnormal growth
[DE85-017803] N86-17741
SURGES
Fluid transients in pipes. Reduction and control of pressure surges in liquids
[ESDU-84013] N86-17663
SURVEYS
Nonintrusive shaft speed sensor N86-17406
Tool wear monitoring systems
[CETIM-100560] N86-17761
SWEAT
Heat transfer in impermeable clothing: Sweat plays a role after all
[IZF-1985-9] N86-17992
SWEAT COOLING
Heat transfer in impermeable clothing: Sweat plays a role after all
[IZF-1985-9] N86-17992
SWEPT WINGS
The analysis of practical transonic swept wings with and without boundary layer effects N86-17300
SWEPTBACK WINGS
A numerical solution of the transonc integral equation and its application to three-dimensional transonic wing design N86-17298
Transonic wind tunnel tests of a swept supercritical wing-body model, PT 8
[FFA-TN-1982-24] N86-17316
SWITCHES
Optical switch
[DE85-017783] N86-18184
SWITCHING CIRCUITS
Recovery circuit for snubber energy in power electronic applications with high switching frequencies N86-17451
Design of high-voltage, high-power, solid state remote power controllers for aerospace applications N86-17456
An analytical investigation of current-injected control for constant-frequency switching regulators N86-17458
Time domain analysis of an S3R system --- sequential switching shunt regulator (S3R) N86-17463
Design and development of a current limited solid state hybrid switch --- spacecraft power supplies N86-17464
Detailed design of a 13 kA 13 kV dc solid-state turn-off-switch
[DE85-013874] N86-17623
Ultra-fast photoconductive switches
[RSRE-MEMO-3784] N86-18208
SWITCHING THEORY
An analytical investigation of current-injected control for constant-frequency switching regulators N86-17458
Power switching cell modeling: An easy way --- spacecraft power supplies N86-17460
Time domain analysis of an S3R system --- sequential switching shunt regulator (S3R) N86-17463
SYNCHRONISM
Establishment and use of time unification system for civil aviation N86-17648
SYNCHROTRON RADIATION
Survey of chemical speciation of trace elements using synchrotron radiation
[DE85-017850] N86-17516
Low level RF system for the Fermilab Tevatron
[DE85-017440] N86-18166
SYNCHROTRONS
Proposals for synchrotron light sources
[DE85-017444] N86-18168
SYNTAX
Syntax and defining equations for an interrupt mechanism in process algebra
[CWI-CS-R8503] N86-18092
SYNTHESIS (CHEMISTRY)
Low temperature methanol synthesis catalyst and process development
[DE85-017837] N86-17511
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
Reaction enhancement of heterogeneously catalyzed reactions by concentration forcing
[DE86-000220] N86-17514
Self-propagating reactions for synthesis of high temperature materials
[AD-A159869] N86-17535
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
Method of synthesizing and growing copper-indium-diselenide (CuInSe2) crystals
[DE85-017729] N86-18215
SYNTHETIC APERTURE RADAR
Analogue SAR signal processing: Architecture and technology
[REPT-3881-ISSUE-1-VOL-2] N86-17601
A synthetic aperture radar system simulation model: SARSIM
[DFVLR-MITT-85-11] N86-17607
A high power, pulsed microwave tube for a synthetic aperture radar electrical model. Phase 2: Manufacture and test
[EVT-852] N86-17632
Study of a land use of synthetic aperture radar, executive summary
[ESA-CR(P)-2067-VOL-1] N86-17825
Study of a land use of synthetic aperture radar. Volume 1: Main report
[ESA-CR(P)-2067-VOL-2] N86-17826
SYNTHETIC FIBERS
Calculating the vulnerability of synthetic polymers to autoignition during nuclear flash
[DE85-016649] N86-17571
SYNTHETIC FUELS
Sample conditioning and standard preparation for synfuel gas analysis
[DE85-010073] N86-17506
SYSTEM EFFECTIVENESS
Plan for evaluation of the training potential of helmet-mounted display and computer-generated synthetic imagery
[AD-A160299] N86-17705
Computer-managed instruction: Crystallized and fluid intelligence
[AD-A160017] N86-18013
Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104
SYSTEM IDENTIFICATION
Predicting windspeed: A system theoretical approach
[REPT-49] N86-17961
Structural and parametric identification of Multiple Input Multiple Output program guide (MIMO) systems according to Guidorzi N86-18038
Structural and parametric identification of Multiple Input Multiple Output (MIMO) sustems according to Guidorzi, program guide N86-18039
Structural and parametric identification of Multiple Input Multiple Output (MIMO) systems according to Guidorzi. Further developments and applications N86-18040
Uncertainty estimation from system identification
[OUEL-1570/85] N86-18075
SYSTEMS ANALYSIS
Time domain analysis of an S3R system --- sequential switching shunt regulator (S3R) N86-17463
Expert systems for design and simulation
[DE85-017565] N86-18053
SYSTEMS ENGINEERING
The design of shielded enclosures, especially for high-voltage laboratories
[S/T-REPT-VOL-2-NO-11] N86-17360
Bio-observation subsystem, phase A study, executive summary --- Spacelab
[REPT-648-DT-6-ISSUE-1] N86-17364
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-1] N86-17365
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-2] N86-17366
Design and development of a pyrotechnique arming and firing unit --- spacecraft pyrotechnics N86-17465
Report on the joint activities of the Ugo Bordoni Foundation and the Istituto Superiore delle Poste e delle Telecomunicazioni --- communications research N86-17603
Activities report of the Department of Systems and Communications, CNRS-UA 820
[ENST-85D002] N86-17611
Expert systems for design and simulation
[DE85-017565] N86-18053
Methods for Designing Software to Fit Human Needs and Capabilities. Proceedings of the Workshop on Software Human Factors
[AD-A156647] N86-18242
Information Systems development aids
[DE85-018161] N86-18246
Analog to digital (A/D) conversion at the Metsaehovi (Finland) Radio Research Station N86-18266
SYSTEMS SIMULATION
Spacecraft Orbital Power Evaluation (SCOPE) N86-17442
Photovoltaic array simulation N86-17449
Exact continuous models of Pulse Width Modulation (PWM) regulators in both continuous and discontinuous conduction modes --- spacecraft power supplies N86-17459
Power switching cell modeling: An easy way --- spacecraft power supplies N86-17460
A synthetic aperture radar system simulation model: SARSIM
[DFVLR-MITT-85-11] N86-17607
Validation of a software package for communication systems analysis and design: The TOPSIM 3 software
[ESA-CR(P)-2075] N86-18029
Structural and parametric identification of Multiple Input Multiple Output program guide (MIMO) systems according to Guidorzi N86-18038
Structural and parametric identification of Multiple Input Multiple Output (MIMO) sustems according to Guidorzi, program guide N86-18039
Structural and parametric identification of Multiple Input Multiple Output (MIMO) systems according to Guidorzi. Further developments and applications N86-18040
SYSTEMS STABILITY
Nonlinear systems: An introduction to describing functions
[ESDU-84009] N86-18058

T

TABLES (DATA)
Activities report for the West German civil airports. Part 2: Tables
[ISBN-3-87977-056-5-PT-2] N86-17327
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
TAKEOFF
Operational application of the STALINS method for measuring take-off and landing trajectories
[NLR-TR-83010-U] N86-17346
TANKS (CONTAINERS)
Experimental generation of stratified shear flows
[AD-A160304] N86-17668
TARGET ACQUISITION
Photosimulation of target acquisition in the presence of smoke: A pilot study
[IZF-1984-36] N86-17986

TARGET MASKING
Photosimulation of target acquisition in the presence of smoke: A pilot study
[IZF-1984-36] N86-17986
The Smoke Transmission and Reflection Threshold (START) model; the Oldebroek (Netherlands) 2 trials, May 1981
[IZF-1984-22] N86-18187

TAXIING
Estimation of load exceedances of an aircraft under carriage with nonlinear properties excited by random runway unevenness
[NLR-TR-84030-U] N86-17348

TECHNOLOGY ASSESSMENT
Bio-Observation Subsystem (BOSS) feasibility study --- Spacelab
[BOSS-010-MT] N86-17362
The results of some end of life tests on the OTS battery N86-17448
Physical chemical tests and feasibility study of the Ciba-Geigy R6376 IM6 prepreg --- fiber reinforced composites
[DGT-26.749] N86-17484
A reference survey of pyrolysis of explosives
[FOA-C-20580-D1] N86-17581
Technology achievements and projections for communication satellites of the future
[NASA-TM-87201] N86-17595
Analogue SAR signal processing: Architecture and technology
[REPT-3881-ISSUE-1-VOL-2] N86-17601
Tool wear monitoring systems
[CETIM-100560] N86-17761
Electrochemical storage and conversion: Batteries and fuel cells
[DE85-018177] N86-17886
Novel computer architectures for data storage and retrieval
[BLRDR-5845] N86-18005

TECHNOLOGY TRANSFER
Powder metallurgy: Technology and equipment
[BLL-M-36380-(5828.4)] N86-17524

TECHNOLOGY UTILIZATION
Utilization of the Swedish experiment module within the TEXUS 9/10 flight opportunity
[M5/7-14] N86-17363
Filament winding: An industrial procedure --- composite materials
[SNIAS-852-430-117] N86-17496
Melt processable liquid crystal polymers. Part 1: A review of current developments
[RARDE-MEMO-50/84-PT-1] N86-17566
The hardening of technical adhesives
[CETIM-101370] N86-17576
Applications and scientific uses of ERS-1 radar altimeter data
[ESA-CR(P)-2084] N86-17823
Channel design for closed cycle MHD
[NLR-MP-84053-U] N86-18205

TECTONICS
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 2: Lithospheric structure, seismicity, and contemporary deformation of the United States Cordillera
[NASA-CR-176499] N86-17929
Northeastern regional geologic characterization report. Volume 3: Plates
[DE86-000418] N86-17938

TEFLON (TRADEMARK)
Study of surface discharges
[ONERA-RF-10/7236-PY] N86-17639

TELECOMMUNICATION
Publications, catalog 1985 N86-18249

TELEOPERATORS
Human-machine interfaces for teleoperators: An overview of research and development at the Oak Ridge National Laboratory. Consolidated Fuel Reprocessing Program
[DE85-017713] N86-17630

TEMPERATURE
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544

TEMPERATURE CONTROL
Measurement of thermo-optical properties of thermal control materials
[ESA-PSS-01-709-ISSUE-1] N86-17375
Limitations in variable conductance heat pipe performance and control predicted by the current steady-state model developed at NLR
[NLR-MP-84009-U] N86-17695

TEMPERATURE DEPENDENCE
Factors affecting Pi sub k in HTPB formulations N86-17390
Corrosion of metals by hydrazine N86-17395
Structural phase transition in CeCu6
[DE85-018362] N86-18223
Polar fluids: Photoemission and electronic energy levels
[DE85-016974] N86-18227

TEMPERATURE DISTRIBUTION
Laminar forced convective heat transfer of power law fluids in isosceles triangular ducts with peripheral wall conduction N86-17659
Thermal stratification in direct gain passive heating systems with variable heating of the floor and one vertical wall
[DE85-016860] N86-17677

TEMPERATURE EFFECTS
Development of a piezoelectric quartz pressure sensor for avionics with excellent long term stability (with final demonstration of the results on a prototype)
[BMFT-FB-W-85-010] N86-17353
Relationship between components and performance of composite materials. Part 1: BSL914 matrix systems --- carbon fiber-epoxy
[ONERA-RT-1/3636-M-PT-1] N86-17488
The effect of quenching rate on the temperature and strain-rate sensitivity of uranium 2w/o molybdenum alloy
[OUEL-1577/85] N86-17528
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544
Influence of the present practice of heat straightening of thick steel plates (over 20 mm) on the mechanical properties
[CETIM-100-840] N86-17560
The influence of heat affected zone microstructures on the ductility and hydrogen embrittlement of 9 percent Cr 1 percent Mo steel
[AERE-R-11473] N86-17564
Demonstrated results of welded and soldered interconnections N86-17866
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018082] N86-18189

TEMPERATURE GRADIENTS
Utilization of the Swedish experiment module within the TEXUS 9/10 flight opportunity
[M5/7-14] N86-17363
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017875] N86-17956

TEMPERATURE MEASUREMENT
Total normal emittance measurements of highly conductive, opaque materials using a solar furnace
[DE85-016578] N86-17508
Temperature fixed points. 1: Possible devices in the range 0 to 125 C
[NPL-QU-70] N86-17701

TEMPERATURE SENSORS
Precision cryogenic temperature data acquisition system
[DE85-017847] N86-17712

TEMPERING
Hyperfine fields in Fe-Ni-X alloys and their application to a study of tempering of 9Ni steel
[DE85-011517] N86-17538

TEMPORAL RESOLUTION
Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728

TENSILE PROPERTIES
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites
[OUEL-1578/85] N86-17480
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites
[OUEL-1579/85] N86-17481
Evaluation of the Ciba-Geigy R6376 IM6 prepreg --- fiber reinforced plastics
[DGT-26.649] N86-17485
Relationship between components and performance of composite materials. Part 1: BSL914 matrix systems --- carbon fiber-epoxy
[ONERA-RT-1/3636-M-PT-1] N86-17488
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060

TENSILE STRENGTH
Lecture notes on fatigue, static tensile strength and stress corrosion of aircraft materials and structures. Part 2: Figures
[VTH-LR-360-PT-2] N86-17345
Statistics on the basic characteristics of carbon epoxy composites
[DGT-27.039] N86-17487
Metallurgical and assembling fatigue characterization of the alloys 2214T451, 7010T73651 and 2024T351 in plates (50 to 70 mm, 120 to 125 mm) and in thick forged bars
[DGT-25.919] N86-17552
A pendulum impactor for measuring the resistance of materials to jerk strains
[FOA-C-20577-D4] N86-17725

TENSOR ANALYSIS
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060

TERRAIN
Wind speed profiles over terrain with roughness changes for flat or hilly sites
[ESDU-84011-A] N86-17949

TERRAIN ANALYSIS
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815

TEST FACILITIES
Utilization of the Swedish experiment module within the TEXUS 9/10 flight opportunity
[M5/7-14] N86-17363
High strain-rate properties of materials
[BR94080] N86-17785
Array technology and applications N86-17872
Brightness measurements on the Livermore high brightness test stand
[DE86-000016] N86-18157

TEST PATTERN GENERATORS
Functional built-in-test in a pipeline image processor --- satellite imagery
[NLR-MP-84020-U] N86-17379

TEXTURES
Pressing effect and stress corrosion cracking of an extruded AlZnMgCu type aluminum alloy
[BMFT-FB-T-85-087] N86-17558

THEMATIC MAPPING
CNPq/INPE-LANDSAT system
[E86-10019] N86-17814
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815
Spectroradiometric calibration of the Thematic Mapper and multispectral scanner system
[E86-10022] N86-17816
Advanced techniques for lithologic and fracture analysis utilizing thematic mapper and topographic data
[DE85-018220] N86-17935
Tsunamis in Peru-Chile
[PB85-247815] N86-17973

THEORETICAL PHYSICS
Activities report in fundamental research on matter (FOM) N86-18118

THERMAL CONDUCTIVITY
Composite materials for thermal energy storage
[DE85-017743] N86-17881

THERMAL CONTROL COATINGS
Thin film coatings for improved alpha/epi N86-17867

THERMAL CYCLING TESTS
Thermal stress cycling of GaAs solar cells N86-17865
Demonstrated results of welded and soldered interconnections N86-17866

THERMAL DEGRADATION
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862

THERMAL ENVIRONMENTS
A review of space-related thermophysical research at NLR
[NLR-MP-84063-U] N86-18256

THERMAL FATIGUE
Slow crack growth: Macroscopic and microscopic aspects
[DE85-011165] N86-17798
Thermal shock behavior of beryllium limiters in Tokamak fusion devices
[DE85-017815] N86-18195

THERMAL INSULATION
Method of measuring emittance of thermal insulation materials at low temperatures N86-17650

THERMAL PROTECTION
Investigations concerning the aging behavior of heat-insulated aluminum composite profiles
[BMFT-FB-T-85-086] N86-17483
THERMAL SHOCK
Thermal shock behavior of beryllium limiters in Tokamak fusion devices
[DE85-017815] N86-18195
THERMAL STABILITY
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477
THERMAL STRESSES
Thermal stress cycling of GaAs solar cells N86-17865
THERMISTORS
Temperature fixed points. 1: Possible devices in the range 0 to 125 C
[NPL-QU-70] N86-17701
THERMODYNAMIC EFFICIENCY
Efficiency calculation for gas turbines: Searching for simple relations between thermodynamic efficiency of a gas turbine and efficiency determining parameters
[SS-44] N86-17766
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236
THERMODYNAMIC PROPERTIES
Measurement of thermo-optical properties of thermal control materials
[ESA-PSS-01-709-ISSUE-1] N86-17375
Thermodynamic properties and microscopic structure of fluids and fluid mixtures
[DE85-016482] N86-18234
THERMODYNAMICS
ALKACYCL: A basic computer program for the analysis of alkali metal Rankine power cycles
[DE85-018125] N86-18022
THERMOELASTICITY
TECATE: A code for anisotropic thermoelasticity in high-average-power laser technology, phase 1
[DE85-016067] N86-17736
THERMONUCLEAR REACTIONS
Activities report in fundamental research on matter (FOM) N86-18118
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152
THERMOPHYSICAL PROPERTIES
A review of space-related thermophysical research at NLR
[NLR-MP-84063-U] N86-18256
THERMOPLASTIC FILMS
Flexible intermediate film with a large temperature range for aeronautical utilization --- windshields N86-17339
THERMOPLASTIC RESINS
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568
THERMOPLASTICITY
Theoretical and experimental investigations of a thermoplastic constitutive law
[RUB-IFM-MITT-43] N86-18233
THERMOSETTING RESINS
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568
THIN AIRFOILS
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304
THIN FILMS
Sputter deposition system for controlled fabrication of multilayers
[DE85-017521] N86-17582
Physical and chemical characterization of multilayered structures
[DE85-016922] N86-17624
Overview of SERI's high efficiency solar cell research N86-17841
Further research on high open circuit voltage in silicon solar cells N86-17842
GaAsP on GaP top solar cells N86-17847
Experience with OMCVD production of GaAs solar cells N86-17852
Photon radiation effects on CdS/CuInSe2 thin film solar cells N86-17857
Thin film coatings for improved alpha/epi N86-17867
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879
Development of thin-film solar cells based on amorphous silicon
[BMFT-FB-T-85-096] N86-17893
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219
Catalytic reactivity of thin crystal surfaces
[DE85-018293] N86-18228
THIN WALLED SHELLS
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801
THREE DIMENSIONAL BOUNDARY LAYER
Boundary layer calculations on the leeward surface of a slender delta wing at incidence
[NLR-TR-84001-U] N86-17700
THREE DIMENSIONAL FLOW
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
Numerical analysis of fully three-dimensional flow in transonic turbine cascades N86-17279
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
A theoretical exploration of the capabilities of 2D flexible wall test sections for 3D testing
[NLR-MP-84018-U] N86-17322
Quasi three-dimensional finite element flow calculation in pumps N86-17678
Application of linked three-dimensional Planetary Boundary Layer (PBL) and dispersion models to New York City --- air pollution N86-17904
THREE DIMENSIONAL MOTION
Three-dimensional flight-path reconstruction by means of spline approximation
[NLR-TR-83091-U] N86-17347
THRUST MEASUREMENT
Thrust measurements for ramjet performance documentation N86-17401
Vacuum chamber pressure effects on thrust measurements N86-17425
THRUST VECTOR CONTROL
Thrust vector technology demonstration N86-17384
IUS propulsion status N86-17415
TILES
Thermal shock behavior of beryllium limiters in Tokamak fusion devices
[DE85-017815] N86-18195
TIME DEPENDENCE
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
One-dimensional prediction of the interface motion separating two immiscible fluids enclosed in a long duct
[PDR/CFDU/IC/19] N86-17690
Time-driven algorithms for distributed control --- computer networks
[CWI-CS-R8510] N86-18037
Brownian motion
[AD-A160020] N86-18103
TIME MARCHING
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
Numerical flow analysis for axial flow turbine N86-17281
TIME MEASUREMENT
Establishment and use of time unification system for civil aviation N86-17648
TIME SERIES ANALYSIS
Modified confidence intervals for the mean of an autoregressive process
[AD-A160055] N86-18107
TIN ALLOYS
Narrow band gap amorphous silicon semiconductors
[DE85-017753] N86-18218
TIROS N SERIES SATELLITES
On-line superposition of geographical data to TIROS-N type meteorological satellite images
[NLR-TR-82133-U] N86-17962
TITANIUM ALLOYS
Fatigue performance of prestressed composite pressure vessels
[SNIAS-852-430-114] N86-17494
Numerical simulation of impact tests and comparison of behavior laws
[SNIAS-852-320-101] N86-17813
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
TITANIUM NITRIDES
Development of a single phase surface layer of TiN on steel
[REPT-1570] N86-17550
TOKAMAK DEVICES
Analysis of the unbalanced NBI rotation experiments in the ISX-B, PLT and PDX Tokamaks
[DE85-017616] N86-18193
Thermal shock behavior of beryllium limiters in Tokamak fusion devices
[DE85-017815] N86-18195
Antenna analysis and boundary conditions for Alfven wave studies in tokamaks
[DE85-018011] N86-18196
NE-213-scintillator-based neutron detection system for diagnostic measurements of energy spectra for neutrons having energies greater than or equal to 0.8 MeV created during plasma operations at the Princeton Tokamak Fusion Test Reactor
[DE85-018079] N86-18198
Simultaneous measurement of current and plasma density profiles in the TEXT Tokamak
[DE85-017679] N86-18200
TOLERANCES (MECHANICS)
Damage-tolerant aircraft design
[NLR-MP-84005-U] N86-17342
TOMOGRAPHY
Imaging techniques utilizing optical fibers and tomography
[DE85-017536] N86-18186
TOOLS
Tool wear monitoring systems
[CETIM-100560] N86-17761
TOPOGRAPHY
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
Advanced techniques for lithologic and fracture analysis utilizing thematic mapper and topographic data
[DE85-018220] N86-17935
TOROIDAL PLASMAS
Analysis of the unbalanced NBI rotation experiments in the ISX-B, PLT and PDX Tokamaks
[DE85-017616] N86-18193
Three dimensional toroidal magnetohydrodynamic particle code
[DE86-000239] N86-18202
TOROIDS
Survey of physical property data for several alloys
[DE85-018138] N86-17542
TORSIONAL STRESS
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
TORSIONAL VIBRATION
Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects
[NASA-TM-87207] N86-17789
TOWED BODIES
Stochastic measurements and systems implications
[AD-A159827] N86-18122
TOWERS
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236
TOXICITY
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds
[DE85-017094] N86-17505
TRACE CONTAMINANTS
Hanford 1964 atmospheric boundary layer experiment: Micrometeorological and tracer data archive. Set 002 documentation report
[PB85-243145] N86-17963
TRACE ELEMENTS
Survey of chemical speciation of trace elements using synchrotron radiation
[DE85-017850] N86-17516
TRACHEA
Assessment of individual human exposures to ozone in a health study
[PB85-245975] N86-17984
TRACKING FILTERS
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
Comparison of a jump-diffusion tracker with a Kalman tracker: An evaluation with emphasis on air traffic control
[NLR-TR-83063-U] N86-17335
An efficient filter for abruptly changing systems
[NLR-MP-84071-U] N86-18056
TRADEOFFS
Reusable software: Trade-off analysis and a new approach
[AD-A159813] N86-18009
TRAILING EDGES
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304

TRAINING DEVICES
Computer-managed instruction: Crystallized and fluid intelligence
[AD-A160017] N86-18013
Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104
TRAINING EVALUATION
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport
[REPT-1] N86-17985
TRAJECTORIES
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017875] N86-17956
TRAJECTORY ANALYSIS
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017875] N86-17956
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109
TRANSDUCERS
The application of sensors in light tests
[NLR-MP-84056-U] N86-17352
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704
TRANSEARTH INJECTION
The O sub 2/H sub 2 propulsion module for planetary spacecraft injection energy augmentation N86-17422
TRANSFER FUNCTIONS
Nonlinear systems: An introduction to describing functions
[ESDU-84009] N86-18058
TRANSFER OF TRAINING
Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104
TRANSFER ORBITS
Radiation exposure and performance of multiple burn LEO-GEO orbit transfer trajectories N86-17417
Analysis of electric propulsion concepts for near-term mission application N86-17424
TRANSIENT PRESSURES
Fluid transients in pipes. Reduction and control of pressure surges in liquids
[ESDU-84013] N86-17663
TRANSIENT REACTOR TEST FACILITY
Test of a measuring instrument composed of two local flow turbines, two drag bodies, a full flow turbine and a two-beam densitometer, of the Large Pressurized Water Reactor Offnormal Behavior Investigation (LOBI) instrumentation in a transient two-phase flow
[KFK-3877] N86-17694
TRANSIENT RESPONSE
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858
TRANSISTOR AMPLIFIERS
A pulsed 8 W FET power amplifier at 9.4 Ghz
[FOA-C-30402-E] N86-17613
TRANSISTOR CIRCUITS
Modelling transmission gates in ELLA
[AD-A159557] N86-17618
TRANSITION
Transition systems, infinitary languages and the semantics of uniform concurrency
[CWI-CS-R8506] N86-18034
TRANSITION FLOW
Low Reynold's number boundary layers in a disturbed environment
[NASA-CR-175031] N86-17665
TRANSITION METALS
Correlation and collective modes in narrow band materials
[AD-A160310] N86-18210
TRANSITION TEMPERATURE
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769
TRANSMITTANCE
Some aspects of the atmospheric radiance model of LOWTRAN 6
[DFVLR-FB-85-33] N86-17945
TRANSONIC FLOW
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment N86-17278
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282
Numerical analysis for steady transonic flows past an airfoil using AF scheme N86-17289
Numerical analysis of transonic flow around two-dimensional airfoil by solving Navier-Stokes equations N86-17292
Analysis of high Reynolds number transonic flow around an airfoil N86-17293
Validation and comparison with experiment of a high Reynolds number transonic flow airfoil analysis code NSFOIL N86-17294
The comparison of the transonic airfoil calculation by NSFOIL with the wind tunnel test data at high Reynolds number N86-17295
A numerical solution of the transonc integral equation and its application to three-dimensional transonic wing design N86-17298
A wing design based on the three-dimensional transonic inverse method and the comparison with the wind tunnel testing data N86-17299
The analysis of practical transonic swept wings with and without boundary layer effects N86-17300
Inverse method with geometry constraints for transonic airfoil design
[NLR-MP-84069-U] N86-17311
Results for analytical transonic flow patterns with weak shock waves over curved walls with a corner
[STN-9] N86-17319
A survey of computational methods for subsonic and transonic aerodynamic design
[NLR-MP-84066-U] N86-17323
Computation of viscous compressible flow in a turbomachine blade array
[ONERA-RSF-27/7077-AY-408] N86-17693
TRANSONIC FLUTTER
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment N86-17278
TRANSONIC WIND TUNNELS
Transonic wind tunnel tests of a swept supercritical wing-body model, PT 8
[FFA-TN-1982-24] N86-17316
TRANSPARENCE
Flexible intermediate film with a large temperature range for aeronautical utilization --- windshields N86-17339
TRANSPONDERS
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder --- Olympus television satellite N86-17454
TRANSPORT PROPERTIES
Rare earth chemical and physical metallurgy
[DE85-015536] N86-17537
A theoretical and experimental study of noncondensible turbulent bubbly jets N86-17661
Analysis of simultaneous heat and mass transfer in soils below solar ponds
[DE85-012163] N86-17877
Atmospheric dispersion models and their limitations
[TI85-018522] N86-17905
TRANSPORT THEORY
Limitations in variable conductance heat pipe performance and control predicted by the current steady-state model developed at NLR
[NLR-MP-84009-U] N86-17695
Markov tree model of transport in area preserving maps
[DE86-000237] N86-18238
TRANSPORTATION
Vibrational stability behaviour of orthotropic plates in steel roads bridges: Application for financial support of a research project by the ECSC (European Coal and Steel Community)
[BLL-TRANS-3225-(9057.2451)] N86-17778
TRAVELING CHARGE
An automated charge monitoring system for the NPL linear accelerator
[NPL-RS(EXT)80] N86-18136
TRAVELING WAVE AMPLIFIERS
The 230W Traveling Wave Tube Amplifier (TWTA) power supply design --- Olympus television satellite N86-17453
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder --- Olympus television satellite N86-17454
Application of current-control modulator (MC2) control feedback for 12 GHz 20 W Electric Power Conditioner (EPC) for Telecom satellite N86-17455
TRAVELING WAVE TUBES
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder --- Olympus television satellite N86-17454
TREES (MATHEMATICS)
Markov tree model of transport in area preserving maps
[DE86-000237] N86-18238
TRESCA FLOW
The rotating disk and the yield conditions of Tresca and von Mises
[LAB-REPT-759] N86-17810
TRIBOLOGY
Possibilities of protection from abrasive and adhesive wear
[BLL-RISLEY-TR-5166-(9091.9F)] N86-17744
Identification of tribological research and development needs for lubrication of advanced heat engines
[DE85-018154] N86-17756
TRITIUM
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152
TRIVALENT IONS
Systematic view of optical absorption spectra in the actinide series
[DE85-018406] N86-18225
TROPOSPHERE
One-channel adaptive antenna for troposhere microwave relay lines N86-17642
Observations of the J = 10 manifold of the pure rotational band of phosphine on Saturn
[NASA-TM-86851] N86-18277
TSUNAMI WAVES
Tsunamis in Peru-Chile
[PB85-247815] N86-17973
TUBE HEAT EXCHANGERS
Low-fin staggered tube banks: Heat transfer and pressure-loss for turbulent single-phase crossflow
[ESDU-84016] N86-17664
TUNGSTEN
Development of refractory composites with improved fracture toughness
[DE86-000257] N86-17479
TUNGSTEN ALLOYS
Heavy metal alloys containing 30% to 90% tungsten
[DE85-017896] N86-17546
TURBINE BLADES
Numerical analysis of fully three-dimensional flow in transonic turbine cascades N86-17279
Cyclic structural analyses of anisotropic turbine blades for reusable space propulsion systems N86-17404
TURBINE PUMPS
Advanced seals for Liquid Oxygen (LOX) turbopumps N86-17408
Quasi three-dimensional finite element flow calculation in pumps N86-17678
Flow calculation in pump impellers by finite elements N86-17679
TURBOFAN ENGINES
Estimation of drag due to inoperative turbo-jet and turbo-fan engines using data item nos. 81009 and 84004
[ESDU-84005] N86-17305
TURBOGENERATORS
Magnetic field of excitation winding in experimental cryogenic turbogenerator N86-17653
TURBOMACHINE BLADES
Computation of viscous compressible flow in a turbomachine blade array
[ONERA-RSF-27/7077-AY-408] N86-17693
TURBOMACHINERY
Activities report of the Department of Engineering N86-18255
TURBULENCE
Current status of research on evolution of longitudinal vortices in wall turbulence N86-17272
Numerical simulation method for combustion in an oxyhydrogen rocket motor N86-17283
Development of a two-scale turbulence model and its application N86-17662
Aspects of turbulence in nonlinear systems, year one
[DE85-016253] N86-18188
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018082] N86-18189
TURBULENCE METERS
Uncorrelated noise in turbulence measurements
[PB85-212314] N86-17968
TURBULENT BOUNDARY LAYER
Studies of the flow field near a NACA 4412 aerofoil at nearly maximum lift
[RAE-TM-AERO-2026] N86-17307
Horseshoe vortex formation around a cylinder N86-17658
Experimental study of the shock wave-turbulent boundary layer interaction
[DE85-016583] N86-17676
Progress in the development of a two-fluid model of turbulence for near-wall flows. Part 2: Heat-transfer characteristics of a boundary layer
[CFD/84/8-PT-2] N86-17686

TURBULENT FLOW
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
Development of a two-scale turbulence model and its application N86-17662
Low Reynold's number boundary layers in a disturbed environment
[NASA-CR-175031] N86-17665
Experimental study of the shock wave-turbulent boundary layer interaction
[DE85-016583] N86-17676
Two-fluid models of turbulence
[NASA-CR-176419] N86-17687
Models and prediction of turbulent flow with particles
[ONERA-RTS-21/7135-EY] N86-17692

TURBULENT JETS
A theoretical and experimental study of noncondensible turbulent bubbly jets N86-17681

TURBULENT MIXING
Lagrangian modeling of turbulent dispersion --- air pollution N86-17901

TURBULENT WAKES
A basic computer code for industrial burner designs. Part 1: Capability test in isothermal swirling flows N86-17284

TWO DIMENSIONAL BODIES
Vorticity shedding over two-dimensional bodies N86-17656

TWO DIMENSIONAL FLOW
Computation of the two-dimensinal incompressible Navier-Stokes equations using an implicit factored method N86-17277
A study of high Reynolds number laminar separation N86-17302
Studies of the flow field near a NACA 4412 aerofoil at nearly maximum lift
[RAE-TM-AERO-2026] N86-17307
Results for analytical transonic flow patterns with weak shock waves over curved walls with a corner
[STN-9] N86-17319
Development of a Two-Dimensional/Axisymmetric implicit Navier-Stokes solver using flux-difference splitting concepts and fully general geometry
[AD-A159776] N86-17667
A two-dimensional model for boiling in an active particle bed: BOIL
[VKI-TN-153] N86-17681
The numerical calculation of particle-size distributions in 2D jets and boundary layers
[CFD/85/6] N86-17688

TWO FLUID MODELS
Progress in the development of a two-fluid model of turbulence for near-wall flows. Part 2: Heat-transfer characteristics of a boundary layer
[CFD/84/8-PT-2] N86-17686
Two-fluid models of turbulence
[NASA-CR-176419] N86-17687

TWO PHASE FLOW
Measurements of the two phase flow in the neighborhood of the exhaust of a 7.62 mm caliber gun
[ISL-R-110/84] N86-17518
A two-dimensional model for boiling in an active particle bed: BOIL
[VKI-TN-153] N86-17681

TWO STAGE TURBINES
Small, two-stage, partial-admission turbine N86-17386

U

U.S.S.R.
Powder metallurgy: Technology and equipment
[BLL-M-36380-(5828.4)] N86-17524

UBV SPECTRA
Photometry of R Coronae Borealis and hydrogen-deficient carbon stars, 1982-3 N86-18275

ULTRAHIGH FREQUENCIES
The 1984 L-band radar experiment. Part 1: Ground truth Flevo (Netherlands) 1984 --- SIR-B N86-17609
Area coverage of radio networks: Method description and propagation measurements in urban area
[FOA-C-30397-E2] N86-17612

ULTRASONIC RADIATION
The use of ultrasonic wave attenuation to monitor polymer and composite quality
[AERE-R-11704] N86-17777

ULTRASONIC TESTS
NDE (Non-Destructive Evaluation) publications, 1982
[PB85-244069] N86-17776
Estimation of flaw size in ultrasonic testing of welds in unalloyed and low-alloy steels
[BLL-RISLEY-TR-5229-(9091.9F)] N86-17782

ULTRASONICS
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures N86-17771
NDE (Non-Destructive Evaluation) publications, 1982
[PB85-244069] N86-17776

ULTRAVIOLET LASERS
Ultraviolet laser-induced photocondensation in the benzol vapor phase
[MPIS-4/1985] N86-17520

ULTRAVIOLET RADIATION
Intense excitation source of blue-green laser
[AD-A160303] N86-17733
Preliminary results of the study of ultraviolet background with IUE
[PREPRINT-447] N86-18279

ULTRAVIOLET SPECTRA
Ultraviolet problem and analytical properties of classical field theories
[PREPRINT-451] N86-18239

UNDERCARRIAGES
Estimation of load exceedances of an aircraft under carriage with nonlinear properties excited by random runway unevenness
[NLR-TR-84030-U] N86-17348

UNDERGROUND STRUCTURES
Rock failure criteria for design of underground structural supports
[AD-A159807] N86-17932

UNDERWATER ACOUSTICS
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123
An explicit scheme for the prediction of ocean acoustic propagation in three dimensions
[AD-A160053] N86-18125

UNDERWATER BREATHING APPARATUS
Performance comparison of thirty, two-stage demand regulators --- underwater breathing apparatus
[ARE(M6)-TM-83818] N86-17987

UNSTEADY FLOW
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations N86-17273
Investigations on efficient numerical method for subsonic lifting surfaces N86-17285
Subsonic unsteady aeroelasticity: The potential method applied to lifting surfaces
[ONERA-RT-21/3064-RY-045-R] N86-17315

UNSTEADY STATE
Unsteady three-dimensional surface theory with the free surface effect: Supercritical case
[ONERA-P-1984-1] N86-17683

URANIUM ALLOYS
The effect of quenching rate on the temperature and strain-rate sensitivity of uranium 2w/o molybdenum alloy
[OUEL-1577/85] N86-17528

URANIUM FLUORIDES
Separation of a gas from a gas mixture
[DE85-018296] N86-17512

URBAN PLANNING
Study on a city's safety: Poitiers (France)
[SNIAS-852-422-104] N86-18257

USER MANUALS (COMPUTER PROGRAMS)
The dynamics of mechanisms with deformable links
[LAB-REPT-758] N86-17790
The SPACAR program system for the analysis of the motion of spatial mechanisms. User manual
[LAB-REPT-739] N86-17793
A FORTRAN 77 program and user's guide for the calculation of partial correlation and standardized regression coefficients
[TI85-016573] N86-18018
ORION: An interactive color post-processor for two dimensional finite element codes, revision 2
[DE85-017876] N86-18021
Structural and parametric identification of Multiple Input Multiple Output program guide (MIMO) systems according to Guidorzi N86-18038
Structural and parametric identification of Multiple Input Multiple Output (MIMO) systems according to Guidorzi, program guide N86-18039
The VIDEDP manual
[FOA-C-10212-M4] N86-18041
Information Systems development aids
[DE85-018161] N86-18246

USER REQUIREMENTS
Study of user segment of Navsat
[ESA-CR(P)-2089] N86-17332
Hoops
[CETIM-13-N-243] N86-17767

V

VACUUM CHAMBERS
Analysis in simulated space environment of composite material behavior
[SNIAS-852-430-116] N86-17495

VACUUM DEPOSITION
Vacuum MOCVD fabrication of high efficience cells N86-17848
Experience with OMCVD production of GaAs solar cells N86-17852

VACUUM MELTING
Vacuum arc remelting: An overview
[DE85-016458] N86-17751

VALENCE
Systematic view of optical absorption spectra in the actinide series
[DE85-018406] N86-18225

VALVES
Multi-port valve assembly
[DE85-017769] N86-17753

VANADATES
Coupled electron-nuclear magnetism and neutron diffraction
[DE85-016479] N86-17539

VANADIUM ALLOYS
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220

VANES
LOX/LH2 vane pump for auxiliary propulsion systems N86-17397

VAPOR BARRIER CLOTHING
Heat transfer in impermeable clothing: Sweat plays a role after all
[IZF-1985-9] N86-17992

VAPOR DEPOSITION
Oxidation resistant coatings for refractory metals N86-17399
Development of a single phase surface layer of TiN on steel
[REPT-1570] N86-17550
Metal film deposition by laser breakdown chemical vapor deposition
[DE85-017554] N86-17738
Vacuum MOCVD fabrication of high efficience cells N86-17848
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219

VAPOR PHASES
Ultraviolet laser-induced photocondensation in the benzol vapor phase
[MPIS-4/1985] N86-17520
Simulation of flame acceleration in unconfined vapor cloud explosions
[VTT-RR-357] N86-17698

VAPORIZING
On recovery of platinum from spent catalysts
[CE-TRANS-8042] N86-17499

VAPORS
Heat transfer from a high temperature condensable mixture. 2: Sedimentation of fog condensate
[DE85-018377] N86-17673
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906

VARIABILITY
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909

VARIABLE STARS
Optical and infrared photometry of southern early-type shell stars and pre-main-sequence variables N86-18274

VARIATIONS
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544

VARISTORS
High-field ZnO varistors: microstructures and properties
[DE85-018136] N86-17626

VECTOR SPACES
Magnetization reversal in triaxial single-domain particles N86-17651
Equivalent-circuit calculations for built-up magnetic structures by projection method N86-17655
Waveform vector quantization: The algebraic approach
[ENST-85C004] N86-18096

VELOCITY
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 2: Lithospheric structure, seismicity, and contemporary deformation of the United States Cordillera
[NASA-CR-176499] N86-17929
Magnetic charge and non-associative algebras
[DE85-009931] N86-18068
VELOCITY DISTRIBUTION
Wind turbulence input model for horizontal axis wind turbines N86-17303
VELOCITY MEASUREMENT
Nonintrusive shaft speed sensor N86-17406
Measurement of velocity of object moving near large reflecting surface N86-17649
Vorticity shedding over two-dimensional bodies N86-17656
The application of optimal control methods to the deconvolution of velocity meter signals
[ISVR-TR-128] N86-17717
VENTS
A waterproof vent valve for immersion suits
[REPT-515] N86-17988
VERTICAL TAKEOFF AIRCRAFT
Hot Gas Laboratory twin nozzle calibration
[BAE-ARG-200] N86-17666
VERY LARGE SCALE INTEGRATION
Analysis of dielectric layers for Very Large Scale Integration (VLSI) applications, especially the influence of stoichiometry and hydrogen content on the properties of plasma nitride layers
[BMFT-FB-T-85-059] N86-17635
Ultra-fast photoconductive switches
[RSRE-MEMO-3784] N86-18208
VIABILITY
Reusable software: Trade-off analysis and a new approach
[AD-A159813] N86-18009
VIBRATION
Activities report of the Institute of Sound and Vibration Research N86-17685
VIBRATION EFFECTS
Parametric study of the amplification factor in the energy balance method
[TI85-010472] N86-18111
VIBRATION MODE
Development and application of a direct algorithm adapted to the discrete Fourier transform for the determination of the modal parameters of linear vibration systems
[RUB-IFM-MITT-42] N86-17786
VIBRATIONAL SPECTRA
Investigation of the dynamics of selectively rotation-vibrationally excited difluoromethylene
[MPIS-5/1985] N86-18160
The red band spectrum of gaseous CaH. Molecular equilibrium ground state constants. Term values of the A(2)Pi, B(2)Sigma, and X(2)Sigma states
[USIP-85-13] N86-18164
VIKING SPACECRAFT
The hot plasma spectrometers on Viking
[KGI-PREPRINT-077] N86-17377
VIRGINIA
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822
Water resources data for Virginia water year 1984
[PB85-242105] N86-17836
VISCOELASTICITY
Response of viscoelastic slab to viscous slab to viscous fluid flow N86-17657
VISCOMETERS
Study on the measuring of polymer rheological properties by adapting an injection molding machine
[CETIM-5-650-06] N86-17574
VISCOPLASTICITY
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
Upsetting of viscoplastic medium between two rigid plates in presence of friction
[BLL-M-36390-(5828.4)] N86-17745
Numerical simulation of impact tests and comparison of behavior laws
[SNIAS-852-320-101] N86-17813
VISCOSITY
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
Viscosity, granular-temperature and stress calculations for shearing assemblies of inelastic: Frictional disks
[DE85-015173] N86-17794
VISCOUS FLOW
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
Numerical solution of viscous compressible flows past an airfoil using unconditionally stable explicit method N86-17290
A study of high Reynolds number laminar separation N86-17302
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672
Computation of viscous compressible flow in a turbomachine blade array
[ONERA-RSF-27/7077-AY-408] N86-17693
VISIBILITY
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951
VOICE COMMUNICATION
Low cost voice compression for mobile digital radios
[NASA-CR-176490] N86-17594
VOICE DATA PROCESSING
Visualisations of speech based on a model of the peripheral auditory system
[NPL-DITC-62/85] N86-17593
Speech processing for intelligibility improvement
[IZF-1985-14] N86-17610
VOLT-AMPERE CHARACTERISTICS
Discharge detection in high voltage flight hardware N86-17457
VOLTAGE CONVERTERS (DC TO DC)
Recovery circuit for snubber energy in power electronic applications with high switching frequencies N86-17451
VOLTAGE REGULATORS
Improving the response time of a switching regulator using SENSIT and DESIGN/ASTAP --- spacecraft power supplies N86-17462
Time domain analysis of an S3R system --- sequential switching shunt regulator (S3R) N86-17463
Influence of the bus regulation on telecommunication spacecraft power system and distribution N86-17467
VOLTERRA EQUATIONS
Stability, multiplicity and global continuation of symmetric periodic solutions of a nonlinear Volterra integral equation
[CWI-AM-R8502] N86-18078
VORTEX SHEDDING
Vorticity shedding over two-dimensional bodies N86-17656
VORTEX SHEETS
Comment on the yaw stability of a horizontal-axis wind turbine at small angles of yaw
[NPL-MP-84084-U] N86-17312
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699
VORTICES
Current status of research on evolution of longitudinal vortices in wall turbulence N86-17272
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304
Horseshoe vortex formation around a cylinder N86-17658
Tricritical behavior in the ferromagnetic superconductor ErRh4B4
[DE85-018339] N86-18229
VORTICITY
Vorticity shedding over two-dimensional bodies N86-17656
VULCANIZED ELASTOMERS
Modification of vulcanized elastomer surfaces to diminish adherence to metals
[CETIM-100340] N86-17575
VULNERABILITY
Calculating the vulnerability of synthetic polymers to autoignition during nuclear flash
[DE85-016649] N86-17571

W

WAKES
Studies of the flow field near a NACA 4412 aerofoil at nearly maximum lift
[RAE-TM-AERO-2026] N86-17307
WALL FLOW
Current status of research on evolution of longitudinal vortices in wall turbulence N86-17272
Results for analytical transonic flow patterns with weak shock waves over curved walls with a corner
[STN-9] N86-17319
Laminar forced convective heat transfer of power law fluids in isosceles triangular ducts with peripheral wall conduction N86-17659
Progress in the development of a two-fluid model of turbulence for near-wall flows. Part 2: Heat-transfer characteristics of a boundary layer
[CFD/84/8-PT-2] N86-17686
WAR GAMES
The RAND-ABEL programming language: History, rationale, and design
[AD-A159821] N86-18010
WASTE DISPOSAL
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937
Northeastern regional geologic characterization report. Volume 3: Plates
[DE86-000418] N86-17938
WASTE ENERGY UTILIZATION
Test and operation program STEP 100 (German-Australian solar power plant in Meekatharra, Western Australia)
[BMFT-FB-T-85-077] N86-17887
WASTE HEAT
Test and operation program STEP 100 (German-Australian solar power plant in Meekatharra, Western Australia)
[BMFT-FB-T-85-077] N86-17887
WATER
Stress corrosion cracking of 316 stainless steel in high temperature water
[BR94397] N86-17529
Experimental generation of stratified shear flows
[AD-A160304] N86-17668
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
WATER MANAGEMENT
Hydrological description of a study area around pump station 't Klooster (the Netherlands); application of hydrological models and remote sensing
[NOTA-1542] N86-17831
Study of effects of pump station Olden Eibergen (Netherlands) on agriculture using remote sensing and hydrological models
[NOTA-1544] N86-17833
WATER MASERS
Correlated variability in the W49N water maser source N86-18264
WATER POLLUTION
Physiochemical transformation of radioactive nuclei in water environments
[CISE-2694] N86-17914
WATER QUALITY
Water resources data for Oklahoma, water year 1983
[PB85-236289] N86-17834
Water resources data for Michigan, water year 1984
[PB85-237741] N86-17835
Water resources data for Virginia water year 1984
[PB85-242105] N86-17836
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837
WATER RESOURCES
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822
Water resources data for Oklahoma, water year 1983
[PB85-236289] N86-17834
Water resources data for Michigan, water year 1984
[PB85-237741] N86-17835
Water resources data for Virginia water year 1984
[PB85-242105] N86-17836
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837
WATER TABLES
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837

WATER TEMPERATURE
Water resources data for Michigan, water year 1984 [PB85-237741] N86-17835
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins [PB85-239606] N86-17837
WATERSHEDS
Oxygen-18 study of the atmospheric-aquatic linkage in three Adirondack lake watersheds [DE85-018355] N86-17912
WAVE ATTENUATION
The use of ultrasonic wave attenuation to monitor polymer and composite quality [AERE-R-11704] N86-17777
WAVE INTERACTION
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes [AD-A158468] N86-17533
WAVE PROPAGATION
USSR report: Electronics and electrical engineering [JPRS-UEE-84-016] N86-17640
Research on propagation of decimetric radiowaves at high latitudes N86-17641
Wave propagation in thick damped laminated plates [AASU-344] N86-17787
Effects of strong diffraction on the focusing and scattering of acoustic waves N86-18120
Scattering of an acoustic field by a nonhomogeneous nonuniform flow [ONERA-P-1985-1] N86-18127
WAVE SCATTERING
The scattering of Gaussian beams incident on a transmitting layer configuration N86-17589
Effects of strong diffraction on the focusing and scattering of acoustic waves N86-18120
WAVEFORMS
The use of filters in digital coherent receivers operating in a jamming and noise environment [AD-A159792] N86-17596
Waveform vector quantization: The algebraic approach [ENST-85C004] N86-18096
WAVEGUIDES
The interaction between electric dipoles and waveguiding surfaces at optical frequencies N86-18178
WAVELENGTHS
Absolute wavelength measurement and fine structure determination in (7)Li 2 [DE85-018382] N86-18235
WEAK INTERACTIONS (FIELD THEORY)
Commutator of the quark mass matrices in the standard electroweak model and a measure of maximal CP-violation [USIP-85-14] N86-18173
WEAR
Possibilities of protection from abrasive and adhesive wear [BLL-RISLEY-TR-5166-(9091.9F)] N86-17744
Tool wear monitoring systems [CETIM-100560] N86-17761
WEAR RESISTANCE
The boriding of refractory metals [BLL-BISI-23037-(9022.060)] N86-17527
WEATHER
World weather watch: On implementation [WMO-639] N86-17958
WEATHER FORECASTING
World weather watch: On implementation [WMO-639] N86-17958
WEATHER STATIONS
Limited surface observations climatic summary LISOCS. Gilze-Rijen, Netherlands [AD-A159863] N86-17952
Revised Uniform Summary of Surface Weather Observations, Sparrevohn AFS, Alaska [AD-A159864] N86-17953
WEATHERING
Investigations concerning the aging behavior of heat-insulated aluminum composite profiles [BMFT-FB-T-85-086] N86-17483
WEAVING
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites [OUEL-1578/85] N86-17480
WEIGHT INDICATORS
Application of surface acoustic wave resonators to quartz bending beams as integrated dilation recorders in balances (load cells) [BMFT-FB-T-85-058] N86-17803
WEIGHT REDUCTION
Design of hat-stiffened composite panels under uniaxial compression and shear. Minimum mass optimization based on a simplified theory [VTH-LR-312] N86-17806
WELD STRENGTH
Static and fatigue strength of explosion welded plates [BLL-RISLEY-TR-5232-(9091.9F)] N86-17784
WELDED JOINTS
Weld seam-tracking with an optical sensor using structured light N86-17764
Ductile-to-brittle transition in steel weldments for arctic structures [PB85-227098] N86-17769
Estimation of flaw size in ultrasonic testing of welds in unalloyed and low-alloy steels [BLL-RISLEY-TR-5229-(9091.9F)] N86-17782
Fatigue in a welded join made by pulsed MIG welding of a 304 type stainless steel [BLL-RISLEY-TR-5233-(9091.9F)] N86-17783
Demonstrated results of welded and soldered interconnections N86-17866
WELLS
Water resources data for Virginia water year 1984 [PB85-242105] N86-17836
Multiwell Experiment Geophysics Program [DE86-001147] N86-17940
WEST GERMANY
Activities report for the West German Civil Airports. Part 1: Text [ISBN-3-87977-056-5-PT-1] N86-17326
Activities report for the West German civil airports. Part 2: Tables [ISBN-3-87977-056-5-PT-2] N86-17327
Activities in air traffic control N86-17331
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport [REPT-1] N86-17985
WETTABILITY
Possibilities of protection from abrasive and adhesive wear [BLL-RISLEY-TR-5166-(9091.9F)] N86-17744
WHITE LIGHT HOLOGRAPHY
White light optical information processing [AD-A160311] N86-18180
WIND MEASUREMENT
Evaluation of data obtained from atmospheric laser Doppler velocimeter [NASA-CR-178474] N86-17703
WIND PRESSURE
Wind speed profiles over terrain with roughness changes for flat or hilly sites [ESDU-84011-A] N86-17949
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama [AD-A159603] N86-17951
WIND PROFILES
Wind speed profiles over terrain with roughness changes for flat or hilly sites [ESDU-84011-A] N86-17949
WIND TUNNEL MODELS
Scale model of the SWD 5000 LW rotor wind tunnel tests for different blade setting angles --- windpowered pumps [WM-074] N86-17313
A theoretical exploration of the capabilities of 2D flexible wall test sections for 3D testing [NLR-MP-84018-U] N86-17322
WIND TUNNEL TESTS
Development of subsonic computational aerodynamic program using panel method N86-17286
A wing design based on the three-dimensional transonic inverse method and the comparison with the wind tunnel testing data N86-17299
Recent experience in the RAE 5 meter wind tunnel of a china clay method for indicating boundary layer transition [RAE-TM-AERO-2007] N86-17306
Estimation of divergence and flutter boundaries on supersonic plate wing models from subcritical random responses due to air turbulence [NAL-TR-856] N86-17308
A rapid method for estimating equivalent parabolic polars from wind-tunnel tests [RAE-TM-AERO-2034] N86-17309
Scale model of the SWD 5000 LW rotor wind tunnel tests for different blade setting angles --- windpowered pumps [WM-074] N86-17313
Low speed aerodynamic characteristics of a two-dimensional sail wing with adjustable slack of the sail [VTH-LR-307] N86-17314
Transonic wind tunnel tests of a swept supercritical wing-body model, PT 8 [FFA-TN-1982-24] N86-17316
A wind tunnel investigation of the effect of a propulsive jet on controls located on a conical afterbody in subsonic and supersonic free streams [FFA-TN-1985-11] N86-17318
A theoretical exploration of the capabilities of 2D flexible wall test sections for 3D testing [NLR-MP-84018-U] N86-17322
Hot Gas Laboratory twin nozzle calibration [BAE-ARG-200] N86-17666
Experimental study of the shock wave-turbulent boundary layer interaction [DE85-016583] N86-17676
Fluctuating wind effects --- air pollution - pollution dispersal N86-17900
Postprocessing NLR High Speed Tunnel (HST) wind tunnel data by data by means of Engineering Data Interactive Presentation and Analysis System (EDIPAS) [NLR-MP-84083-U] N86-18032
Sound excitation during vortex-airfoil interaction [MPIS-MITT-80] N86-18130
Engineering Data Interactive Presentation and Analysis System (EDIPAS): A general approach to engineering data management and analysis applied to wind tunnel testing [NLR-MP-83057-U] N86-18252
WIND TUNNEL WALLS
A theoretical exploration of the capabilities of 2D flexible wall test sections for 3D testing [NLR-MP-84018-U] N86-17322
WIND TUNNELS
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270
WIND TURBINES
Wind turbulence input model for horizontal axis wind turbines N86-17303
Comment on the yaw stability of a horizontal-axis wind turbine at small angles of yaw [NPL-MP-84084-U] N86-17312
Microprocessor control of wind-driven induction generators N86-18050
WIND VARIATIONS
Field test of an autonomous wind-diesel power plant [BMFT-FB-T-85-092] N86-17892
Fluctuating wind effects --- air pollution - pollution dispersal N86-17900
WIND VELOCITY
Wind speed profiles over terrain with roughness changes for flat or hilly sites [ESDU-84011-A] N86-17949
Predicting windspeed: A system theoretical approach [REPT-49] N86-17961
WINDMILLS (WINDPOWERED MACHINES)
Activities report in windmill research [WM-068] N86-17838
The CWD 4000 project (formerly THT-1) — windmill [WM-075] N86-17888
Activities report on the Technical Highschool Twente (THT) CWD windmill project [WM-090] N86-17889
WINDOWS (APERTURES)
Investigations concerning the aging behavior of heat-insulated aluminum composite profiles [BMFT-FB-T-85-086] N86-17483
WINDPOWER UTILIZATION
Activities report in windmill research [WM-068] N86-17838
Activities report on the Technical Highschool Twente (THT) CWD windmill project [WM-090] N86-17889
Predicting windspeed: A system theoretical approach [REPT-49] N86-17961
WINDPOWERED GENERATORS
Activities report in windmill research [WM-068] N86-17838
Field test of an autonomous wind-diesel power plant [BMFT-FB-T-85-092] N86-17892
Microprocessor control of wind-driven induction generators N86-18050
WINDPOWERED PUMPS
Scale model of the SWD 5000 LW rotor wind tunnel tests for different blade setting angles --- windpowered pumps [WM-074] N86-17313
Activities report in windmill research [WM-068] N86-17838
WINDSHIELDS
Flexible intermediate film with a large temperature range for aeronautical utilization --- windshields N86-17339
WING PROFILES
A wing design based on the three-dimensional transonic inverse method and the comparison with the wind tunnel testing data N86-17299
WING TIP VORTICES
Sound excitation during vortex-airfoil interaction [MPIS-MITT-80] N86-18130
WINGS
Design and fabrication of an advanced composite cellular wing box [VTH-LR-315] N86-17344

WIRE BRIDGE CIRCUITS
An experimental verification of predicted current and voltage waveforms in a three-phase full-wave rectified bridge circuit with source resistance and inductance when driving a purely resistive load --- permanent magnet alternator
[RAE-TR-83084] N86-17616
WISCONSIN
North Central regional geologic characterization report. Volume 2: Plates
[DE86-000419] N86-17939
WORLD METEOROLOGICAL ORGANIZATION
World weather watch: On implementation
[WMO-639] N86-17958
Activities report in world meteorology
[WMO-644] N86-17959
International list of selected, supplementary and auxiliary ships --- WMO
[WMO-47-ED-85] N86-17971

X

X RAY APPARATUS
Study of a resonant converter using power transistors in a 25 kW X-ray tube power supply N86-17466
X RAY IMAGERY
Determining behavior of solid rocket motor internal components using dynamic real-time radiography N86-17382
Visualization of interior ballistic phenomena
[SNPE-NT-27/85/CRB/NP] N86-17580
X RAY LASERS
Lithium soft X-ray laser N86-17730
Density gradient free electron collisionally excited X-ray laser
[DE85-017726] N86-17739
X RAY SPECTRA
Coupling between plastic scintillators and light fibers for remote detection of X-rays
[DE85-016946] N86-17707
X RAY TELESCOPES
X-ray satellite
[NASA-TM-77997] N86-17370
X RAYS
Coupling between plastic scintillators and light fibers for remote detection of X-rays
[DE85-016946] N86-17707
Density gradient free electron collisionally excited X-ray laser
[DE85-017726] N86-17739

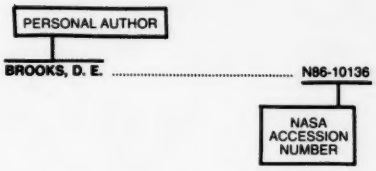
Y

YAW
Comment on the yaw stability of a horizontal-axis wind turbine at small angles of yaw
[NPL-MP-84084-U] N86-17312
Estimation of sideforce, yawing moment and rolling moment derivatives due to rate of yaw for complete aircraft at subsonic speeds
[ESDU-84002] N86-17357
YAWING MOMENTS
Estimation of sideforce, yawing moment and rolling moment derivatives due to rate of yaw for complete aircraft at subsonic speeds
[ESDU-84002] N86-17357
YIELD STRENGTH
Initial results for the failure strength of a LOVA gun propellant at high pressures and various strain rates N86-17402
The rotating disk and the yield conditions of Tresca and von Mises
[LAB-REPT-759] N86-17810
YTTRIUM
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426
YTTRIUM ISOTOPES
An intercomparison of measurements of the beta spectra of 90Sr-90Y
[NPL-RS(EXT)77] N86-18134

Z

ZINC OXIDES
High-field ZnO varistors: microstructures and properties
[DE85-018136] N86-17626
ZIRCONIUM
Improved separators for silver-hydrogen cells
[AERE-R-11513] N86-17633
ZIRCONIUM OXIDES
Development of refractory composites with improved fracture toughness
[DE86-000257] N86-17479
ZODIACAL DUST
Infrared observations of novae N86-18272

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

ABE, T. N86-17269
ADDY, A. L. N86-17676
ADIROSI, D. N86-17454
ADOUL, J. P. N86-18096
AGRELL, J. N86-17317
N86-17318
AHMAD, M. N86-18207
AIDUN, C. N86-17660
AKULOV, V. V. N86-17523
ALBUGUES, F. N86-17492
N86-17495
ALDANA, F. N86-17439
ALDRIDGE, J. N86-18053
ALEXOVICH, R. E. N86-17368
ALFERDINCK, J. W. A. M. N86-17723
ALKEZWEENY, A. J. N86-17908
ALLAN, R. N86-17332
ALLEN, W. R. N86-18211
ALYEA, E. D. N86-18169
AMATUCCI, V. A. N86-17676
AMES, A. L. N86-18024
AMICO, P. J. N86-17934
AMOS, D. E. N86-18071
ANCELLE, J. N86-17488
ANDERSON, C. W. N86-17384
ANDERSON, J. L. N86-17967
ANDERSON, L. N86-17979
ANDERSON, N. N86-17979
ANDERSON, N. S. N86-18242
ANDERSON, R. N86-18010
ANDERSON, R. S. N86-17677
ANDERSON, W. A. N86-17854
N86-17855
ANDERSSON, H. N86-17682
ANDO, S. N86-17285
ANDO, Y. N86-17308
ANDREWS, W. H., JR. N86-17709
ANEVA, S. N86-17499
ANGELINI, J. J. N86-17315
ANICHINI, A. N86-17976
AOKI, S. N86-17281
ARAKI, T. N86-17280
ARBEKOV, V. I. N86-17647
ARNDT, H. N86-18086
ARNOLD, W. N86-17773
ARTHUR, J. N86-17539
ASCHMANN, S. M. N86-17927
ATENCIO, L. G. N86-17708
ATKINSON, R. N86-17927
AURIEMMA, G. N86-18279
AVERBACK, R. S. N86-18145
AVNI, R. N86-17472
AVNIEL, Y. N86-18100
AXE, J. D. N86-18213

B

BAARSLAG, J. F. W. N86-17915
N86-17916
N86-17919
N86-17921
N86-17922
BACH, F. H. N86-17976
N86-17977
BAETEN, J. C. M. N86-18092
N86-18094
BAGWELL, J. W. N86-17595
BAI, Z. D. N86-18067
BAILEY, C. R. N86-17407
BAKER, A. L. N86-18019
BALANTEKIN, A. B. N86-18137
BALLARD, G. S. N86-17628
N86-18115
BALZER-SIEB, R. N86-18171
BANERJEE, S. N86-17854
N86-17855
BANFIELD, R. M. N86-18274
BARBIER, P. N86-17726
BARBOSA, J. A. B. N86-17783
BARCHET, W. R. N86-17910
BARCLAY, J. A. N86-17583
BARDE, H. N86-17434
BARKHOUDARIAN, S. N86-17406
BARNES, N. P. N86-17740
BARNETT, A. M. N86-17844
N86-17847
BARON, F. N86-17446
BARRETT, T. W. N86-17975
BASKIN, I. M. N86-17650
BASS, B. R. N86-17795
BATCHMAN, T. E. N86-18179
BATTRICK, B. N86-17972
BAUER, R. W. N86-18156
BAXTER, V. D. N86-17670
BECKER, B. R. N86-17669
BECKER, P. N86-18129
BECKMAN, T. N86-18041
BEHROOZI, F. N86-18229
BEKEBREDE, G. N86-17920
BENDIEN, J. C. N86-17451
BENNER, J. P. N86-17841
BENNETT, D. A. N86-17926
BENNETT, S. J. N86-17394
BENOCCI, C. N86-17682
N86-17901
BENOIT, R. N86-17512
BENSON, D. K. N86-17881
BENZ, F. N86-17430
BERBAUM, K. S. N86-17705
BERENBRINK, P. N86-17763
BERG, C. N86-17803
BERG, L. E. N86-18164
BERGMAN, G. N86-17568
BERGQUIST, A. N86-17638
BERGSTRA, J. A. N86-18033
N86-18092
N86-18094
BERK, H. L. N86-18202
BERNAU, D. N86-18171
BERRY, G. F. N86-17757
BERRY, H. G. N86-18235
BERTHELOT, H. N86-18029
BERTRAM, L. A. N86-17751
BEST, M. R. N86-17347
BETHIN, J. N86-18220
BETTS, G. E. N86-18176
BETZ, F. E. N86-17862
BHATTACHARYYA, S. N86-17531
BIELAWSKI, J. N86-17569
BILLERBECK, W. J. N86-17868
BILLINGHAM, N. C. N86-17567
BINDSCHADLER, R. A. N86-17817
BIRKS, A. R. N86-17823
BIRX, D. L. N86-18157
BISOGNANO, J. N86-17735
BISSELL, W. R. N86-17421
BITTNER, G. N86-17592
BIZZARRI, R. N86-18172
BJORKEN, J. D. N86-18165
BLACK, J. P. N86-18182
BLAKESLEE, A. E. N86-17849
BLEASDALE, P. A. N86-17526
BLINOV, Y. I. N86-17745
BLOCH, B. N86-17488
BLOM, H. A. P. N86-17334
N86-17335
N86-18056
BLUE, G. D. N86-17396
BOCCADORO, C. H. N86-17680
BOCHICCHIO, F. N86-18279
BOCHICCHIO, M. N86-18080
BODE, M. F. N86-18274
BOEHM, R. F. N86-18236
BOERSTOEL, J. W. N86-17311
N86-17349
N86-17699
BOHN, M. S. N86-17677
BOIS, D. N86-17813
BOISSIERES, J. N86-17366
BOKHARI, S. N86-17997
BOL, K. D. N86-17713
BONATI, A. N86-17453
BONES, R. J. N86-17633
BONFIELD, D. J. N86-17601
BOOZE, C. F., JR. N86-17982
BORGHI, G. N86-17384
BORGHI, R. N86-17692
BORNSTEIN, R. N86-17904
BOTTCHER, C. N86-18137
BOTTS, T. E. N86-17671
BOUCHARD, D. N86-17786
BOUCHER, A. N86-17586
BOUIX, M. N86-17551
BOULAY, J. L. N86-17637
BOWLES, K. J. N86-17477
BOYD, G. A. C. N86-17526
BOYLE, V. J. Y. N86-17965
BOYNTON, J. L. N86-17386
BRABSON, B. B. N86-18169
BRAGT, P. C. N86-17980
BRAUN, R. L. N86-17794
BRENNECKE, J. N86-17819
BRIERRE, M. N86-17574
BRILES, O. N86-17430
BRIMHALL, J. L. N86-17548
N86-18212
BRINKER, D. N86-17851
BRODSKY, S. J. N86-18150
BROGLIO, E. P. N86-17629
BROSNAN, D. A. N86-17572
BROWN, B. E. N86-18049
BROWN, B. S. N86-18170
BROWN, D. P. N86-17584
BROWN, G. V. N86-17789
BROWN, R. H. N86-17411
BROWN, S. N86-17900
BRUCKER, J. P. N86-17734
BRUN, T. O. N86-18231
BRUNEL, F. N86-18202
BRUNET, A. N86-17639
BRUSCHI, M. N86-18112
BRUYN, T. N86-18099
BRYANT, R. N86-18246
BUCHLIN, J. M. N86-17681
BUDNITZ, R. J. N86-17934
BUELL, D. N. N86-17403
BUERGSTEIN, H. N86-18072
BUMB, H. N86-18083
BUNG, W. N86-17760
BURGERS, A. N86-17805
BURKE, W. R. N86-17432
N86-18082
N86-18280
BURNS, D. T. N86-18136
BURROWS, R. W. N86-17881
BURT, D. J. N86-17718
BURTON, H. D. N86-18245
BUSKER, C. A. N86-17313
BUTLER, K. M. N86-18020
BUZZANCA, G. N86-17799
BYRD, G. N86-18262

C

CABANEL, D. N86-17496
CAHEN, G. L., JR. N86-17478
CALAWAY, W. F. N86-17517
CALDWELL, J. A. R. N86-18273
CAMBIER, L. N86-17693
CAMERON, R. L. N86-17817
CAMPBELL, D. A. N86-18206
CAMPBELL, E. M. N86-17739
CANDLER, R. J. N86-17583
CANEILL, J. Y. N86-17898
CAPE, J. A. N86-17848
CAPEL, A. N86-17446
N86-17467
CAPORASO, G. J. N86-18157
CARETTA, E. N86-17799
CARKE, D. W. N86-18054
CARLSON, N. N. N86-17736
CARLSSON, G. N86-17604
CARMICHAEL, A. J. W. N86-18045
CARNALL, W. T. N86-18225
CARNEBIANCA, C. N86-17374
CARNEVALE, E. N86-17678
CARPENTER, J. M. N86-18170
CARPIO, J. N86-17439
CARRERAS, B. A. N86-18189
CARROLL, T. A. N86-17754
CARSEY, F. D. N86-17817
CARTER, D. J. T. N86-18028
CARTER, W. P. L. N86-17927
CASPERD, A. N. N86-17442
CASS, G. R. N86-17925
CASTRO, M. N86-17439
CATCHPOLE, R. M. N86-18272
CAVALLI, C. N86-17488
CEBALLOS, D. C. N86-17371
CERUTTI, J. N86-18053
CHABOCHE, J. L. N86-17356
CHABROL, M. N86-17366
CHALIER, J. N86-17767
N86-17812
CHALLENOR, P. G. N86-18028
CHALMERS, J. S. N86-18148
CHAN, S. H. N86-17673
CHAN, T. F. N86-18125
CHANDLER, G. I. N86-17737
CHANDLER, K. N86-17399
CHANG, R. K. N86-17533
CHANG, T. C. N86-17779
CHARBONNIERE, Y. N86-17550
CHARLTON, L. A. N86-18189
CHARPENTIER, P. N86-17768
CHARRIER, D. N86-17488
CHASE, C. A. N86-17415
CHEN, J. E. N86-17443
CHEN, W. N86-17857
CHENG, J. A. J. N86-17659
CHEREUGIN, V. L. N86-17645
CHERON, Y. N86-17466
CHIOCCHIA, G. N86-17319
CHO, D. H. N86-17673
N86-17674
CHOI, C. G. N86-17858
CHOW, S. N. N86-18078
CHRISTMAS, P. N86-18134
CHU, W. K. N86-18211
CHUAH, H. H. N86-17565
CHUANG, T. Y. N86-18111
CHUM, H. L. N86-17578
CHUN, R. C. N86-18111
CICERI, G. N86-17914
CISZEK, T. F. N86-18215
CLAASEN, H. L. N86-18099
CLAPP, D. J. N86-18051
CLARK, R. N86-17851
CLARKSON, P. M. N86-17717
CLAYTOR, T. N. N86-18126
CLOVER, M. R. N86-17713
COATS, D. W. N86-17957
COFFMAN, I. N86-17628
COFFMAN, J. N86-17947
COHEN, A. M. N86-18076
COHEN, H. N86-18093
COLBURN, C. W. N86-18181
COLE, D. W. N86-17911
COLE, L. A. N86-17841
COLL, M. B. N86-17837
COLLINS, J. C. N86-18143
COLLINS, J. L. N86-18122
N86-18124
COMTAT, M. N86-17446
N86-17447
CONDIFF, D. W. N86-17673
CONGLETON, J. N86-17529
COONEY, P. J. N86-18144
COOPER, A. P. R. N86-17823
COOPER, D. W. N86-17983
CORBETT, R. E. N86-17443
CORNELL, C. A. N86-17934
CORNELL, R. H. N86-17706
CORNET, G. N86-18280
CORRIGAN, D. S. N86-17620
COST, J. R. N86-18220
COSTANTINO, M. N86-17402
COULSON, I. M. N86-18273
N86-18275
N86-18276
COUPRY, G. N86-17340
COWAN, A. M. N86-17823
COWIN, G. W. N86-18044
N86-18046
COX, G. W. N86-17389
COX, J. W. R. N86-17616
CRABTREE, G. W. N86-18229
CRAMER, D. N86-17628
N86-18115
CRANCE, C. N86-18128
CREIGHTON, J. R. N86-17510
CRISP, J. N86-18167
CRITTENDEN, R. R. N86-18169
CRUMP, J. E. N86-17400
CRUSE, D. W. N86-17601
CURTI, G. N86-17784
CURTIS, H. B. N86-17860
CUSSON, R. Y. N86-17711
CZARNITZKI, J. N86-18171

D

DAGEN, A. J. N86-17728
DAHLBERG, B. E. J. N86-18062
N86-18063
DAHLBERG, E. D. N86-18224
DAINES, W. L. N86-17388
DAMBRA, F. N. N86-18133
DANDREA, J. F. N86-17535
DANIELS, H. A. M. N86-17349
DARTS, J. N86-17336
N86-17337
DAS-GUPTA, P. N86-18253
DAVEY, K. R. N86-17599
DAVIDSON, M. N86-17545
DAVIDSON, R. C. N86-17637
DAVIES, J. K. N86-18274
DAY, A. C. N86-17853
DEBAKKER, J. W. N86-18034
N86-18036
DEBARROSAGUIRRE, J. L. N86-17814
DEBOER, S. J. N86-17889
DEBOOM, W. C. N86-17697
DEBRUIN, A. C. N86-17700
DECKER, D. L. N86-18222
DEJUS, R. N86-18231
DEKKER, G. J. N86-17354
DELEEUW, S. W. N86-18226
DELEMOS, M. J. S. N86-17544
DELIL, A. A. M. N86-17695
N86-18256
DEL!SI, D. P. N86-17668
DELLUS, S. N86-17486
DELORME, P. N86-17446
DENBOER, R. G. N86-17314
DENTONKELAAR, J. F. N86-17923
DERRICK, M. N86-18147
DESALVO, G. C. N86-17844
DESNE, J. P. N86-17455
DEVAN, J. H. N86-17585
DEVRIES, O. N86-17312
DEVRIES, R. M. N86-17713
DICKENS, J. K. N86-18198
DICPUA, E. N86-18172
DIEBOLD, J. P. N86-17752
DIEDERICH, P. N86-17332
DIEKMANN, O. N86-18078
DIGIACOMO, N. J. N86-17713
DIKVALL, T. N86-17605
DINARDO, R. P. N86-17582
DISTEFANO, S. N86-17395
DITZLER, W. R. N86-18148
DIXON, W. G. N86-17948
DODSON, K. E. N86-17570
DOLZHENKOVA, E. F. N86-17522
DONALDSON, R. R. N86-18185
DONGUY, P. N86-17384
DOSS, S. K. N86-17736
DOVER, C. B. N86-18153
DOWLING, N. E. N86-17788
DOWNING, D. R. N86-17358
DRAISIN, W. N86-18053
DRAKE, J. B. N86-17669
DRAPER, J. V. N86-17990
DREBLOW, L. M. N86-17443
DREWRY, D. J. N86-17823
DROPPO, J. G. N86-17963
DROS, R. J. P. N86-17920
DROZDOV, A. A. N86-17655
DRUMMOND, T. J. N86-18221
DUDEK, D. N86-17545
DUHAMEL, T. N86-17366
DUIVENVOORDEN, J. J. N86-18007
N86-18047
N86-18048
DUKART, R. J. N86-18194
DUNCUMB, W. R. N86-17442
DUNFORD, W. G. N86-17449
DUNKERTON, L. V. N86-17513
DUNN, K. N86-17528
DURAND, A. N86-17557
DURAND, S. N86-17350
DURSCH, H. N86-17857
DZIERBA, A. R. N86-18169

E

EASTON, F. J. N86-17836
EBBSJOE, I. N86-18226
ECKERLE, W. A. N86-17658
EDDINGTON, P. K. N86-17928
N86-17930
EDELMANN, X. N86-17782
EDMISTON, M. D. N86-18141
EDWARDS, H. N86-18166
EDWARDS, P. R. N86-17336
N86-17337
EEMAN, J. C. J. N86-17457
EGER, M. N86-17803
EGGERS, G. N86-17435
EGUCHI, K. N86-17284
EICHINGER, P. N86-17635
EINFELDT, T. N86-17483
EIROLA, T. N86-18073
EISELE, G. N86-17694
EISFELDER, W. N86-17592
EJIRI, H. N86-17308
ELIASON, J. R. N86-17935
ELIASSON, L. N86-17377
ELLISON, J. A. N86-18211
ELSHOUT, A. J. N86-17924
EMRICH, M. L. N86-18246
ENGELBRECHT, C. N86-18275
ENGSTROEM, B. N86-17719
ENGSTROEM, O. N86-17631
ENTINE, G. N86-17879
ERD, L. N86-18117
ERICKSON, E. F. N86-18277
ERIKSSON, F. N86-17532
ERNE, F. C. N86-17890
ERVENS, W. N86-17559
ESQUIBEL, D. N86-18186
ESSENWANGER, P. N86-17721
ETTINGER, D. G. N86-17573
EVANS, A. N86-18274
EVANS, D. S. N86-17943
EVANS, S. A. N86-17421
EVRENSEL, C. A. N86-17657
EYKHOFF, P. N86-18095

F

FABER, J., JR. N86-18231
FAHS, A. A. N86-17746
FAIBIS, A. N86-17715
N86-18144
FALCIANO, S. N86-18172
FALCIONI, M. N86-18109
FANG, R. N86-17343
FARAH, Y. N86-17584
N86-17712
FARKAS, T. N86-17430
FAUCHER, J. N86-17438
FAURE, F. N86-17639
FEARON, E. M. N86-18152
FEDDERS, P. A. N86-18152
FEHRENBACHER, L. L. N86-17756
FEINBERG, D. A. N86-17578
FELDMAN, M. J. N86-17990
FELDMEIER, F. N86-17483
FERNANDEZ, E. N86-18147
FIDDES, S. P. N86-17309
FIEUX, B. N86-17468
N86-17469
FILIN, Y. V. N86-17650
FIMA, H. N86-17724

FINDL, E. N86-17630
FISHER, C. N86-18174
FISHER, E. M. N86-17677
FITZGERALD, J. N86-18166
FLANDRIN, J. C. N86-17366
FLECHAIS, A. N86-17494
FLETCHER, S. K. N86-18024
FLOETE, A. N86-18171
FLOWER, P. Q. N86-17566
FLURER, R. F. N86-18181
FOCH, H. N86-17466
FOESSMEIER, R. N86-18059
FOLLANSBEE, P. S. N86-17536
FOOTE, H. P. N86-17935
FORAN, M. N86-17511
FORD, C. W. N86-17845
FORMAN, P. R. N86-17737
FORNES, R. E. N86-17476
FORSBECK, A. N86-17581
FOTI, T. N86-17628
FOURNIER, F. N86-18129
FRAAS, L. M. N86-17848
FRANCIS, E. C. N86-17383
FRANCIS, R. W. N86-17862
N86-17865
FRANK, A. J. N86-17625
FRAY, J. M. J. N86-17311
FREEMAN, M. N86-17584
FREGIEN, G. N86-17451
FRENKEL, A. N86-18279
FRESE, K. W., JR. N86-17541
FRIEMAN, E. A. N86-18188
FRIES, R. N86-18147
FRIIS-CHRISTENSEN, E. N86-18283
FRITZSCHE, A. N86-17892
FROLOV, O. P. N86-17642
FRUMIN, V. L. N86-17652
FUHWARA, T. N86-17283
FUJII, K. N86-17271
FUJII, S. N86-17284
FUJIWARA, T. N86-17292
FULTZ, B. N86-17538

G

GABRIEL, S. N86-17365
N86-17366
GABRIELSON, S. N86-17632
GABRIELSON, T. B. N86-18120
GAILLARD, R. N86-17560
GAINES, J. R. N86-18152
GALINDO, D. N86-18029
GALLETTI, A. N86-17758
GAMMAGE, R. B. N86-17906
GANNI, V. N86-17584
GARCIA, L. N86-18189
GARDINER, T. M. N86-17632
GARDNER, D. G. N86-18149
GARDNER, M. A. N86-18149
GARDNER, P. R. N86-18026
GARLICK, G. F. J. N86-17859
GARMLAND, S. N86-17606
GARNER, B. L. N86-18025
GASPARINI, A. N86-17453
GAVER, D. P. N86-17969
N86-18102
GAZONAS, G. A. N86-17780
GEERTS, M. N86-17961
GEIST, G. A. N86-18002
GELINAS, R. J. N86-17736
GENICON, J. L. N86-18224
GENNETT, T. N86-17504
GERIG, R. N86-18167
GERLACH, O. H. N86-17991
GESLOT N86-17762
GETTEMY, D. J. N86-17740
GIBBS, R. J. N86-17584
GIBBS, W. R. N86-18155
GIEDT, D. N86-17381
GILBERT, R. D. N86-17476
GILHAM, L. B. N86-17970
GILL, R. L. N86-18141
GILLESPIE, L. K. N86-17750
GINOCCHIO, J. N. N86-18139
GIRARD, A. N86-17800
GIRLING, S. P. N86-17702
GISBORNE, J. T. N86-17974
GIUSTI, S. N86-17678
GLANTZ, C. S. N86-17963
GLASS, I. S. N86-18272
GLASSER, W. G. N86-17578
GLAZOV, A. I. N86-17647
GLEICH, D. N86-17412
GOBLE, R. L. N86-17926
GODLEWSKI, M. P. N86-17843
GOEBBELS, K. N86-17773
GOEPFERT, W. N86-17820
GOERICKE, D. N86-18171
GOLDBERG, S. N86-18023
GOLDFINE, A. N86-18004
GOLDSMITH, P. N86-17872
GOODMAN, M. C. N86-18278
GOODWIN, R. N86-18167
GOORVITCH, D. N86-18277
GORADIA, C. N86-17851
N86-17856
GORDON, B. M. N86-17516
GORLAND, S. H. N86-17417
GORMAN, M. R. N86-17823
GOURCUFF, F. N86-17552
GRAETCH, J. N86-17421
GRANDPIERRE, M. N86-17438
GRAS, J. N86-17716
GRAVE, A. N86-17813
GRAY, N. N86-18186
GRAYSON, G. N86-17628
GREENE, D. A. N86-18126
GREENE, R. R. N86-18122
GREENHALGH, D. N86-17617
GREENWALD, F. T. N86-17626
GRIESS, J. C. N86-17585
GRIFFITHS, H. D. N86-17823
N86-18028
GRILL, A. N86-17472
GRINBAUM, I. N. N86-17653
GRISNIK, S. P. N86-17425
N86-17426
GRISVAL, J. P. N86-17315
GROTENBREG, J. M. N86-18057
GRUEN, D. M. N86-17517
N86-17741
GSCHNEIDNER, K. A., JR. N86-17537
GUEDEL, A. N86-18127
GUENAYDIN, M. N86-18068
GUENZEL, E. N86-17891
GUGGENHEIM, S. F. N86-17753
GUNDERSEN, A. N86-17361
GURWELL, W. E. N86-17546
GUTMARK, E. N86-17400
GUYETSKIY, B. A. N86-17652
GUYMER, T. H. N86-18028
GUZKOWSKA, M. N86-17823

H

HAARALA, S. N86-18269
HAAS, M. R. N86-18277
HABBADI, A. N86-17438
HADDRELL, A. N86-17332
HAGAN, W. K. N86-18188
HAGEDORN, P. N86-17802
HAGEMANN, D. N86-17430
HAIGHT, R. C. N86-18156
HAIKALA, L. N86-18268
HAINES, J. E. N86-17437
HALL, H. E. N86-18010
HALL, R. J. N86-17413
HALL, W. J. N86-17934
HALLQUIST, J. O. N86-18021
HALOULAKOS, V. E. N86-17414
HAMAKER, H. C. N86-17845
HAMAYA, N. N86-18213
HAMBURG-EVERTS, I. N86-17716
HAMM, R. N86-17408
HAMMEL, B. A. N86-18194
HAMPEL, V. E. N86-18025
HAN, H. C. N86-17599
HAN, K. S. N86-17733
HANSELMANN, G. N86-17887
HANSON, D. L. N86-18194
HARDING, J. N86-17480
N86-17481
N86-17528
HARDING, J. T. N86-17399
HARKLEROAD, O. D. N86-17583
HART, R. E., JR. N86-17866
HARTSUIKER, L. N86-17804
HARVEY, K. M. N86-17601
HASKELL, G. B. N86-17704
HASTINGS, D. E. N86-18190
HASTINGS, R. C. N86-17307
HAUPT, L. N86-18172
HAUTH, L. D. N86-17834
HAWORTH, N. P. N86-17564
HAWTHORNE, A. R. N86-17906
HAYES, R. E. N86-18216
HEATH, M. T. N86-18002
HEDIN, C. E. N86-17824
HEEREMA, F. J. N86-18252
HEERING, J. N86-18033
N86-18035
HEIDA, J. H. N86-17774
N86-17775
HEINRICH, R. N86-17483
HEINZ, R. M. N86-18169
HEISEL, M. N86-17465
HELLMAN, S. N86-18172
HELLWEG, E. N86-17887
HELTON, J. C. N86-18017
HEMKER, P. W. N86-17696
HEMMINGER, J. A. N86-17397
N86-17408
HENRIOT, F. N86-17485
N86-17487
HENZE, C. P. N86-17461
HERAUD N86-17575
HESSELINK, W. H. N86-18072
HICKMAN, R. N86-17571
HICKS, H. R. N86-18189
HILBIG, R. N86-17338
HILL, D. N86-18148
HILL, J. R. N86-18208
HILL, N. W. N86-18198
HIMMENS, I. A. N86-17987
HINCKLEY, C. C. N86-17513
HINDMAN, R. G. N86-17667
HINGERTY, B. E. N86-17505
HINKS, D. G. N86-18223
N86-18224
N86-18229
N86-18232
HIPPSLEY, C. A. N86-17564
HIROSE, N. N86-17293
N86-17294
N86-17295
N86-17300
HIRSCHFELD, T. N86-17507
N86-17515
HIRSEKORN, S. N86-17773
HO, P. N86-17852
HOARD, R. W. N86-18114
HOBSON, P. W. N86-18045
HODGKINS, T. G. N86-17569
HOEFER, H. N86-18117
HOEKSTRA, T. J. N86-17343
HOEMKE, P. N86-17760
HOFMAN, C. F. G. M. N86-17343
HOFMANN, O. N86-17827
HOFTIEZER, J. N86-18148
HOLLAND, W. R. N86-18178
HOLMES, J. A. N86-18189
HOLMES, S. J. N86-17966
HOLMGREN, G. N86-17946
HOLMGREN, S. O. N86-18172
N86-18174
HOLSTI, N. N86-18265
HOLT, B. N86-17817
HOLT, B. D. N86-17912
HOLTET, A. L. R. N86-17361
HORDONNEAU, A. N86-17491
HORNE, W. E. N86-17853
N86-17871
HORTON, W. N86-18151
HOSOKAWA, H. N86-17269
HOTOP, H. J. N86-17333
HOU, F. S. N86-18198
HOUDARD, H. N86-17580
HOVENIER, J. W. N86-18280
HOWARD, W. M. N86-18281
HOWELLS, M. N86-17714
HOY, L. D. D., C.S. N86-17598
HUANG, S. Y. N86-17614
HUFFERD, W. L. N86-17383
HUGHES, T. J. N86-17817
HUHTANEN, R. N86-17698
HUNOLD, K. N86-17577
HURLEY, C. D. N86-17702
HUSSEY, K. J. N86-17925
HUTCHBY, J. N86-17870
HUTCHENS, D. H. N86-18014
HUTCHINS, D. K. N86-17628
HWANG, H. J. N86-17720
HYMAN, L. N86-18147

I

IDZOREK, G. C. N86-17708
IIDA, E. N86-17300
ILEGBUSI, J. O. N86-17686
ILES, P. A. N86-17852
IMAN, R. L. N86-18017
N86-18018
INATANI, Y. N86-17269
INMAN, F. N86-17381
INOUE, Y. N86-17268
INOUYE, M. N86-17275

IORI, M. N86-18172
IRON, J. N86-17497
ISHIGURO, T. N86-17273
ISHII, R. N86-17274
ISHIWATA, S. N86-18186
IYER, R. K. N86-17351
IYYER, N. S. N86-17788

J

JAAKOLA, T. N86-18270
JACKSON, A. N86-17735
JACOBSON, K. B. N86-17505
JAHIER N86-17575
JAHODA, F. C. N86-17737
JAMES, A. W. N86-17563
JAMES, J. J. N86-17479
JANNAKOUDAKIS, A. D. N86-17471
JANNAKOUDAKIS, D. N86-17471
JANOUSEK, B. K. N86-17865
JANSEN, W. J. L. N86-17360
JANSSEN, L. H. J. M. N86-17924
JARAMILLO, S. A. N86-18182
JARLSKOG, C. N86-18173
JENIEC, J. D. N86-17770
JENSEN, N. O. N86-17896
JERVIS, T. R. N86-17738
JI, C. R. N86-18150
JOANNIDES, R. N86-17787
JOENSSON, R. N86-17363
JOHANSSON, B. N86-17604
JOHANSSON, K. E. N86-18174
JOHN, H. N86-17694
JOHNSON, D. N86-18186
JOHNSON, D. W. N86-17911
JOHNSON, E. N86-18234
JOHNSON, J. D. N86-18018
JOHNSON, K. N86-18148
JOHNSON, M. N86-18167
JOHNSON, N. R. N86-18142
JOHNSON, R. M. N86-17711
JOHNSTON, A. K. N86-17332
JON-AND, K. N86-18175
JONA-LASINIO, G. N86-18241
JONES, A. N86-18167
JONES, J. S. N86-18272
N86-18275
JONES, L. W. N86-17420
JONES, S. S. D. N86-17332
JORGENSEN, J. D. N86-18222
N86-18223
N86-18231
N86-18232
JOSHI, O. K. N86-17474
JOSIFEK, C. W. N86-17770
JUDD, R. L. N86-18049
JUERGENS, W. N86-17891
JUN, L. N86-17689
JYONOUCHI, T. N86-17296

K

KAILATH, T. N86-18065
KAITH, I. N86-17428
KALIA, R. K. N86-18226
N86-18229
KAMATH, G. S. N86-17846
KAN, H. K. A. N86-17622
KANG, M. N86-17734
KANTER, E. P. N86-17715
N86-18144
KAPLAN, R. B. N86-17399
KAPUSTINSKY, J. S. N86-17713
KARABAK, Y. V. N86-17646
KARABASOV, Y. S. N86-17526
KARATZAS, I. N86-18103
KARR, L. J. N86-17502
KASCAK, T. J. N86-17368
KASSIES, A. N86-17311
KATAYAMA, M. N86-17286
KATZER, J. N86-18253
KAUER, M. N86-17520
KAUFMAN, A. N86-17404
KAUFMANN, W. B. N86-18155
KAUSCHE, H. N86-17891
KAWAI, N. N86-17293
N86-17294
KAWAMURA, R. N86-17300
KAWAMURA, T. N86-17276
KAWARAZAKI, S. N86-17539
KAZA, K. R. V. N86-17789
KEAVNEY, C. J. N86-17842
KECK, T. S. N86-17703
KELKAR, A. D. N86-17475
KELKEL, K. N86-17802
KELLY, J. M. N86-17911
KEMPEN, P. D. N86-17805
KEMPER, C. A. L. N86-18205
KENIG, C. E. N86-18062
N86-18064
KENNEDY, R. P. N86-17796
N86-17934
KENNEDY, R. S. N86-17705
KERNS, C. N86-18167
KERNS, Q. N86-18166
N86-18167
KESNER, J. N86-18192
KETCHUM, W. J. N86-17416
KHARCHENKO, V. A. N86-17522
KHMARUK, O. N. N86-17654
KIBBLER, A. N86-17849
KIDD, S. J. N86-17617
KIEFT, K. N86-17888
KIKUCHI, T. N86-17308
KILKENNY, D. N86-18274
N86-18275
KINCAID, R. H. N86-17796
KING-HELE, D. G. N86-17931
KING, D. Q. N86-17427
KING, N. S. P. N86-18182
N86-18186
KING, R. W. N86-17401
KISLOVSKI, A. S. N86-17460
KISSINGER, H. E. N86-18212
KJAELDMAN, L. N86-17698
KLEB, R. N86-18222
KLEIBER, K. H. N86-17894
KLIMOV, N. Z. N86-17652
KLINT, P. N86-18033
N86-18035
KLOP, J. W. N86-18092
N86-18094
KLOTZ, S. N86-17904
KLYNNING, L. N86-18164
KNECHTLI, R. C. N86-17846
KNIGHT, L. V. N86-17624
KNOEBEL, U. N86-17892
KNOWLES, S. C. N86-17424
KOAI, K. N86-17675
KOBAYASHI, T. N86-17280
KODAMA, Y. N86-17277
KODERA, T. N86-17294
KOELLE, H. H. N86-18171
KOENIG, W. N86-17715
N86-18144
KOERNER, H. N86-17338
KOHSIEK, W. N86-17743
KOMATSU, K. N86-17300
KONIG, P. N86-18004
KOOIJMAN, P. N86-18147
KOOKER, D. E. N86-17391
N86-17749
KORALSKA, S. N86-17499
KOREMAN, C. G. A. N86-17636
KOREZLIOGLU, H. N86-18074
KORSHIKOV, V. B. N86-17643
KOTAKE, S. N86-17279
KOTYUK, A. F. N86-17643
KOURA, K. N86-17270
KOWALSKI, R. N86-17584
KOYA, M. N86-17279
KRANENBURG, C. G. N86-17346
KRAUSE, F. N86-18259
KRETZSCHMAR, J. G. N86-17897
KRISL, M. E. N86-17867
KRISTENSEN, L. N86-17968
KROKHIM, V. V. N86-17654
KRUEHLER, W. N86-17891
KRZYMINSKII, H. N86-17527
KSENZENKO, A. Y. N86-17649
KUBAN, D. P. N86-17989
KUFA, V. A. N86-17651
KUIKEN, G. D. C. N86-18097
KUITTINEN, K. N86-18266
KUK, A. Y. C. N86-18105
KUMAR, R. N86-17912
KUNTZ, D. W. N86-17676
KURKLIN, J. K. N86-17834
KUROSAKI, R. N86-17286
KUSIAN, W. N86-17891
KUSTOM, R. L. N86-18170
KUZNETSOV, A. A. N86-17644
N86-17645
KYLSTRA, F. J. N86-18110

L

LABRUJERE, T. E. N86-17320
N86-17321
LACASSE, M. N86-18010
LAFAGE, B. N86-17447
LAING, J. D. N86-18275
LAIRD, R. T. N86-17821
LAM, N. Q. N86-17540
LAMALLE, J. N86-17498
LAMB, C. M. N86-17629
LAMBERT, G. A. N86-17674
LAMPLE, G. N86-17469
LANCASTER, C. A. N86-17853
LANDER, G. H. N86-18170
LANDI, J. C. N86-17443
LANE, B. N86-18192
LANE, P. C. N86-17632
LANGEMANN, M. N86-17365
LANGHOUT, G. N86-17610
N86-18131
LARIGALDIE, S. N86-17639
LARSON, S. M. N86-17925
LASHOF, D. A. N86-17710
LAUF, R. J. N86-17626
LAULAINEN, N. S. N86-17908
LAURIDSEN, E. K. N86-17727
LAVEDRINE, P. N86-17330
LAVERY, T. J. N86-18254
LAWANDY, N. M. N86-17731
LAWRENCE, C. N86-17789
LAWTON, E. A. N86-17395
LAYTON, W. J. N86-17569
LEAN, D. E. N86-17309
LEBOEUF, C. M. N86-17841
N86-17877
LEBOEUF, J. N. N86-18201
N86-18202
LEBURTON, J. P. N86-17850
LECERF, J. P. N86-17587
N86-17691
LECHTE, H. N86-17448
LECLERC, J. N86-17683
N86-17684
LEE, D. N86-18125
LEE, E. P. N86-18191
LEE, S. A. N86-18235
LEE, S. J. N86-18137
LEFEBVRE N86-17762
LEFLOCH, C. N86-17726
LEGGETT, P. N86-17433
N86-17448
LEHOCZKY, J. P. N86-18102
LEHTO, A. N86-18267
LEHTO, H. N86-18269
LEITH, E. N. N86-18180
LEMOINE, G. G. N86-17609
LENARD, R. N86-17671
LENSCHOW, D. H. N86-17968
LENSTRA, A. K. N86-18093
LEONARDI, J. N86-17447
LESCINSKY, J. B. N86-17837
LESHT, B. M. N86-17913
LETELLIER N86-17762
LEVATIN, J. L. N86-18021
LEVEQUE, R. N86-17551
LEVESQUE, J. N86-17484
N86-17485
LEVESQUE, M. J. N86-17487
LEVI, A. M. N86-17647
LEVIN, B. C. N86-17501
LEVINS, D. P. N86-17464
N86-17465
LEVINSON, T. M. N86-17756
LEWIS, C. R. N86-17845
LEWIS, V. E. N86-18135
LI, J. C. N86-17549
LI, S. B. N86-17858
LI, S. S. N86-17846
LI, Y. M. N86-18196
LIEDTKE, R. N86-18162
LILJESTROEM, T. N86-18264
LIN, S. R. N86-17303
LINDBLAD, A. N86-17604
LINDENBAUM, S. J. N86-18154
LINDENTHAL, A. N86-18171
LINDHOUT, J. P. F. N86-18205
LING, K. S. N86-17852
LINTHURST, R. A. N86-17926
LIO, Y. O. N86-18108
LIOR, N. N86-17675
LIU, G. N86-17449
LIU, J. N86-18151
LIVI, R. N86-18239
LOBSTEIN. A. N86-17600
LOEVE, W. N86-18030
LOH, A. P. N86-18075
LOMELINO, D. N86-17351
LONGDON, N. N86-18282
LOO, R. Y. N86-17846
N86-17858

LOOS, J. S. N86-18146
N86-18147
LOOTSMA, F. A. N86-18098
LOTENS, W. A. N86-17992
LOUBATON, P. N86-18074
LOUGHRAN, L. B. N86-17933
LOWELL, S. C. N86-17873
LUCAS, P. N86-18167
LUCE, F. N86-17925
LUCZAK, M. A. N86-17619
LUDWIG, F. N86-17904
LUNDIN, R. N86-17377
N86-17943
LUPKER, H. A. N86-17811
LUSIGNOLI, M. N86-18159
LUSK, E. L. N86-18247
LYNCH, D. D. N86-17836
LYONS, P. B. N86-18183

M

MACBETH, A. W. N86-17394
MACCRACKEN, M. C. N86-17956
MACDONALD, C. N. N86-17770
MACH, H. N86-17518
MACHEFER, J. N86-17512
MACHIELSEN, K. C. P. N86-17765
MACHIKIN, V. I. N86-17522
MACMILLAN, P. N. N86-17621
MACONE, D. N86-17596
MADAN, A. N86-17880
N86-18217
N86-18218
MADDEN, P. A. N86-18209
MAGE, D. T. N86-17984
MAHAJAN, D. N86-17511
MAHAJAN, S. M. N86-18196
N86-18202
MAHAN, A. H. N86-18218
MAHAN, V. A. N86-17400
MAIANI, L. N86-18080
MAIWALD, D. N86-18117
MAJKRZAK, C. F. N86-17582
MAKADATE, M. N86-17297
MAKSIMOV, S. B. N86-17745
MALAS, M. A. N86-17534
MALIK, M. A. N86-18193
MALLET-PARET, J. N86-18078
MALYY, M. M. N86-17648
MANDERSCHEID, J. M. N86-17404
MANFRIDA, G. N86-17678
N86-17679
N86-17758
N86-17759
MANNING, R. J. N86-18208
MANORY, R. R. N86-17472
MANYAK, L. K. N86-17523
MANYAK, N. A. N86-17523
MAOR, D. N86-18144
MAPOLES, E. R. N86-18152
MARAIS, C. N86-17488
MARANESI, P. N86-17459
MAREL, G. N86-18172
MARIANI, A. N86-17364
MARKIN, T. L. N86-17633
MARKWORTH, D. N86-17519
MARMOLIN, H. N86-17824
MARQUE, J. P. N86-17639
MARSHALL, B. W., JR. N86-17508
MARSIK, S. J. N86-17405
MARSILI, M. N86-17365
MARTELLI, F. N86-17678
N86-17679
MARTIN, A. W. N86-18104
MARTIN, D. N86-18167
MARTIN, H. N86-18164
MARTIN, H. J. N86-18169
MARTINELLI, G. N86-18080
N86-18109
MARTINEZ, S. N86-17439
MARUSAK, T. J. N86-17874
MARZE, H. J. N86-18133
MASLOV, Y. N. N86-17654
MASSA, F. N86-18279
MASSON, J. N86-17468
MASTIN, C. W. N86-18061
MASTINI, G. N86-17374
MASUR, H. N86-17518
MATHEWS, G. J. N86-18156
N86-18281
MATHEWSON, M. A. N86-17967
MATHIOULAKIS, D. N86-17656
MATJE, P. N86-17577
MATSEPUTO, A. D. N86-17500
MATSUDA, T. N86-17288
MATSUKI, T. N86-18116
N86-18237
MATSUNO, K. N86-17300
MATSUZAKI, Y. N86-17308
MATTHEWS, J. R. N86-18025
MATTHEWS, P. A. N86-17332
MATTHEWS, T. G. N86-17906
MATTHEWS, V. J. N86-17632
MATTILA, K. N86-18263
MATURI, E. M. N86-17966
MAURITZSON-SANDBERG, E. N86-17995
MAUVISSEAU, J. N86-17512
MAYER, H. N86-17484
MAYER, W. N86-17553
MAZUMDER, M. K. N86-17628
N86-18115
MAZURKIEWICZ, M. N86-17553
MCCAPRA, F. N86-17567
MCCARTHY, C. N86-17437
MCCONNELL, J. W. N86-18198
MCCULLERS, W. T., III N86-18012
MCGARY, M. C. N86-18121
MCGINN, V. P. N86-17591
MCINTYRE, N. F. N86-18028
MCINVILLE, R. M. N86-17301
MCKENZIE, S. S. N86-18011
MCKIBBIN, D. D. N86-18277
MCLEOD, P. S. N86-17848
MCLYMAN, W. T. N86-17452
MCMULLIN, P. G. N86-17883
MCNEELY, J. B. N86-17847
MCPHEE, J. R. N86-17359
MCWILLIAMS, R. N86-17584
MEAD, D. J. N86-17787
MEERTENS, J. B. N86-18038
N86-18039
N86-18040
MEINI, L. N86-17799
MEISNER, K. N86-18166
MEISS, J. D. N86-18238
MELDNER, H. W. N86-17711
MELGAARD, K. N86-17946
MEMORY, J. D. N86-17476
MENICUCCI, D. F. N86-17878
MENZEL, K. N86-18117
MERIENNE, M. C. N86-17488
MERKX, F. N86-18027
MERTENS, I. N86-17897
MEULSTEE, C. N86-17722
N86-17829
MEURICE, P. N86-17587
N86-17691
MEYER, H. N86-18161
MEYER, J. N86-17310
MEYER, J. J. C. N86-18034
N86-18036
MEYERS, A. N86-17477
MICHIE, R. B. N86-18196
MIGNANI, R. N86-18081
N86-18240
MIKA, J. J. N86-17970
MILLER, H. N86-18167
MILLER, J. B. N86-17835
MILLER, R. N86-17904
MILLON, E. N86-17366
MILNER, D. N86-17620
MILNER, D. F. N86-17504
MILNER, K. R. N86-17618
MITCHELL, D. M. N86-17458
MITCHELL, R. N86-17999
MITCHELL, R. L. N86-17393
MITTER, P. K. N86-18241
MIYAKAWA, J. N86-17295
MOA, I. N86-18174
MODONDANON, J. P. N86-18224
MOELLER, M. N86-17891
MOHAN, N. N86-17461
MOHTADI, C. N86-18054
MOIR, I. R. M. N86-17306
MOLETTE, P. N86-17365
N86-17366
MOLITORIS, J. J. N86-17707
MONKEL, A. N86-17379
MONTEIRO, S. N. N86-17783
MOONEN, P. I. L. N86-17993
MORAN, C. M. N86-17395
N86-17396
MORDFIN, L. N86-17776
MOREA, S. F. N86-17405
MOREAU, J. P. N86-17960
MORETTO, L. G. N86-18138
MORGENSTERN, G. N86-17608
MORRIS, C. L. N86-17708
MORRIS, J. W., JR. N86-17538
MORRIS, R. N86-17863
MORTAZAVI, P. N86-17714
MOSELEY, V. A. N86-17431
MOY, L. N86-17879
MOYERS, J. C. N86-18022
MUELLER, E. H. N86-17844
MUELLER, G. N86-17893
MULHOLLAND, G. P. N86-17508
MULLENDER, S. J. N86-18251
MUNIZBANDEIRADUARTE, O. C. N86-17369
MURNAN, C. A. N86-18009
MURRAY, P. R. N86-17801
MURRAY, R. C. N86-17957
MUSGRAVE, B. N86-18147
MUSTALESKI, T. M. N86-17772

N

NABITY, J. A. N86-17400
NARAYANAN, A. N86-17846
NEAL, R. N86-17704
NEDROW, P. N86-18186
NEGLEY, G. H. N86-17847
NELSON, C. W. N86-17391
N86-17749
NESTLEROTH, J. B. N86-17771
NEUBERT, T. N86-17946
NEVEU, C. N86-17464
NG, K. C. N86-18015
NICHOLSON, G. A. N86-17932
NICKEL, H. N86-17553
NICKLAS, K. D. N86-17772
NICOLA, V. F. N86-18110
NICOLAS, M. N86-17580
NIEDENZU, K. N86-17569
NIEDENZU, P. M. N86-17569
NIETO, M. M. N86-18214
NILSSON, B. N86-17719
NILSSON, S. N86-17612
N86-18174
NISHIDA, H. N86-17289
NISHIDA, Y. N86-17290
NISHIKAWA, N. N86-17268
NOBACK, R. N86-17348
NOCENTINI, E. N86-17364
NOEL, P. N86-17469
NOH, W. F. N86-17672
NOHISA, T. N86-17296
NOLASCO, C. A. N86-17783
NORTH, D. A. N86-17415
NOTERMANS, R. M. W. N86-17764
NOUAILHAS, D. N86-17356
NYBERG, S. N86-17719
NYE, R. A. N86-17506

O

OBERENDER, W. N86-17760
OBERG, J. L. N86-17835
OBERMEIER, E. N86-17720
ODDY, R. N. N86-18253
OGAWA, S. N86-17273
OGREN, H. O. N86-18169
OGUCHI, K. N86-17294
OHARE, T. N86-17511
OHLMER, E. N86-17694
OHTA, N. N86-17976
OINASKALLIO, E. N86-18266
OKAMOTO, P. R. N86-17540
OLDEROG, E. R. N86-18034
N86-18036
OLIVARI, D. N86-17901
OLLIVER, J. G. N86-17823
OLSEN, A. R. N86-17907
OLSON, J. R. N86-18242
OMUIRCHEARTAIGH, I. G. N86-17969
OMURA, J. K. N86-17594
ONO, K. N86-17291
ORNELLAS, D. N86-17402
ORTEGA, J. M. N86-17998
OSTROUCHOV, G. N86-18069
OTT, E. N86-18238
OVERBEEK, R. A. N86-18247
OVERSLUIZEN, T. N86-17627
OVERTON, W. C. N86-17583
OYELEYE, O. N86-17545

P

PACIELLO, M. L. N86-18109
PACOU, D. N86-17356
PADERIN, L. Y. N86-17650
PADGETT, W. J. N86-18108
PADUANO, J. N86-17358
PADUSCHEK, P. N86-17635
PAGANO, T. S. N86-18182

PAGE, J. D. N86-17462
PAIK, D. K. N86-17665
PALASCHAK, P. A. N86-17883
PALASZEWSKI, B. A. N86-17422
PALMER, J. M. N86-17816
PALMER, M. A. N86-18194
PANKOVA, M. N86-17499
PAPIRER N86-17575
PARD, A. G. N86-17428
PARISI, G. N86-18109
PARKER, S. K. N86-17578
PARKINS, R. N. N86-17529
PARLETT, B. N. N86-18015
PARTAIN, L. D. N86-17848
PASCALI, R. N86-17799
PAT-ANTHONY, F. N86-18013
PATNAIK, P. C. N86-17530
PATTEIN, J. N86-17339
PATTERSON, M. L. N86-17503
PAUL, H. N86-17760
PAULIN, J. L. N86-17580
PAULRAJ, A. N86-18065
PAVEL, J. R. N86-18006
PAWEL, R. E. N86-17542
PECHINGER, U. N86-17904
PEDERSEN, F. H. N86-17450
PEIRE, J. N86-17439
PELLIN, M. J. N86-17517
N86-17741
PENKO, P. F. N86-17425
PERELOMOV, A. M. N86-18079
PEREZBLANCO, H. N86-17585
PERRING, D. N86-17632
PERRY, T. S. N86-17707
PERRYMAN, M. A. C. N86-18282
PERSSON, S. T. N86-17631
PETERMAN, W. N86-17531
PETERS, D. A. N86-17355
PETERS, W. N86-17891
PETERSON, B. G. N86-17624
PETRAK, G. J. N86-17534
PETTERSSON, H. N86-17631
PETTINI, M. N86-18239
PEYROTTE, C. N86-17455
PFLEIDERER, H. N86-17891
PHAN, A. N86-17493
PHILLIPS, G. N86-17632
PICCIOLO, J. J. N86-17479
PICRAUX, S. T. N86-18211
PIERRE, A. C. N86-17491
N86-17561
N86-17562
PIETRZAK-DAVID, M. N86-17438
PIKE, T. K. N86-17607
PINTA, B. N86-18248
PIOTROWSKI, A. N86-18141
PIREDDA, G. N86-18172
PITTS, J. N. N86-17927
PIVIROTTO, T. J. N86-17427
PLAETTNER, R. N86-17891
PLEIJSIER, A. N86-17379
PLURIEN, P. N86-17512
POEPPEL, R. B. N86-17479
POLICELLA, H. N86-17356
PONCIN, A. N86-17437
POOL, A. N86-17346
POST, R. S. N86-18192
POSTLETHWAITE, I. N86-18075
POTTS, C. W. N86-18170
POULSEN, O. N86-18235
POUTSMA, H. J. N86-17917
N86-17918
POWELL, J. R. N86-17671
PRADIER, A. N86-17494
PRAEG, W. F. N86-17623
PRESSMAN, H. N86-17777
PREUSS, R. D. N86-17598
PREWETT, P. D. N86-17470
PRICE, D. L. N86-18230
PRICE, J. M. N86-17983
PRICE, L. E. N86-18147
PROTSCH, R. N86-18171
PRUGH, B. J. N86-17836
PUGH, C. E. N86-17795
PURCELL, S. P. N86-17388

Q

QUEFFEULOU, P. N86-18028

R

RABERN, J. W. N86-17385
RAEISAENEN, A. N86-18267
RAGNISCO, O. N86-18079
N86-18112
RAIZENNE, M. N86-17984
RAJAN, S. D. N86-18123
RAMAKRISHNAN, V. N86-17770
RAMSDELL, J. V. N86-17905
RANK, D. M. N86-18277
RANZOLI, P. N86-17450
RAO, B. B. N86-17854
N86-17855
RAO, C. R. N86-18066
RAPHAELIAN, L. A. N86-17573
RAPLEY, C. G. N86-17823
N86-18028
RARBACK, H. N86-17714
RAUSCHER, B. N86-17891
RE, E. N86-17436
REDD, L. N86-17418
REED, J. W. N86-17934
REEDER, P. L. N86-18141
REEDY, R. P. N86-18184
REIMANN, J. N86-17694
REINSMOEN, N. L. N86-17976
N86-17977
REITER, H. N86-17773
REITTER, T. N86-17571
RENGGLI, C. N86-17928
RENNER, M. N86-17558
RESHOTKO, E. N86-17665
REUILLE, G. N86-17768
REUTER, W. N86-17760
REYNOLDS, W. N. N86-17777
RIBARSKY, M. W. N86-18210
RICE, P. A. N86-17578
RICHARDSON, G. N86-17988
RICHARDSON, R. D. N86-18050
RICHMOND, R. J. N86-17420
RICHTER, D. D. N86-17911
RICHTER, R. N86-17945
RIEHL, W. A. N86-17410
RIGLAR, T. J. N86-17616
RIIS, E. N86-18235
RIKS, E. N86-18085
RINKER, R. G. N86-17514
RIOCHE, S. N86-17329
RISCH, M. R. N86-17353
RISITANO, A. N86-17784
RISS, W. N86-17803
RITCEY, J. A. N86-17590
RITCHIE, R. O. N86-17798
RIZZO, R. N86-17374
ROBERTS, G. N86-18272
ROBERTS, J. N86-17566
ROBERTS, M. J. N86-17709
ROBINS, A. G. N86-17902
N86-17903
ROBINSON, P. N86-17974
ROBINSON, S. M. N86-17755
ROBSON, E. I. N86-18274
ROCCUCCI, S. N86-17440
N86-17454
ROCHER, O. N86-18257
ROEDER, F. N86-17602
ROEFS, H. F. A. N86-18042
ROENNMARK, K. N86-17942
ROFFEY, R. N86-17579
ROGER, M. N86-18129
ROGERSON, D. J., JR. N86-17382
ROHATGI, A. N86-17883
ROLAND, M. M. N86-17390
ROLFE, E. N86-17972
ROMEO, G. N86-17344
N86-17806
ROMERO, V. O. N86-17734
RONCHETTI, C. N86-17799
ROSE, A. M. N86-18104
ROSEN, M. D. N86-17739
ROSEN, V. N86-17763
ROSOCHA, L. A. N86-17734
ROSS, D. W. N86-18196
ROSSI, G. N86-18080
ROTHMAYER, A. P. N86-17302
ROULLE, C. N86-17378
ROUSSEAU, G. N86-17497
ROUZIES, C. N86-17441
ROWE, E. L. N86-17359
ROWNTREE, J. E. N86-17332
RUCKERT, W. N86-17892
RUDNER, S. N86-17613
RUDNITSKIY, L. M. N86-17652
RUEDIGER, G. N86-18259
RUFFO, S. N86-18239
RUIZ, C. N86-17801
RUSELL, D. N86-17857
RUSSOTTI, J. S. N86-17704
RUTKOWSKI, J. V. N86-17501
RYDEN, K. H. N86-17631
RYU, C. M. N86-18193

S

SAAB, A. E. N86-17898
SACHS, I. M. N86-17867
SAGGESE, E. N86-17365
SAHINTEPE, M. N86-18000
SAHNER, R. A. N86-18016
SAINT-CHELY N86-17762
SAINTAUBERT, P. N86-17365
N86-17366
SAITO, T. T. N86-18185
SAKAI, H. N86-17272
SAKAMOTO, J. N86-17269
SAKUMA, R. N86-17268
SALAUEN, P. N86-17683
N86-17684
SALE, K. E. N86-18156
SALESSES, J. N86-17466
SALONEN, E. N86-18269
SALVADOR, R. N86-17904
SAMSON, P. J. N86-17913
SANDAHL, I. N86-17377
SANDBERG, L. N86-17995
SANTORO, T. N86-17704
SAPIENZA, R. N86-17511
SARIEV, I. N86-17499
SATER, J. D. N86-18152
SATO, T. N86-17281
SATOFUKA, N. N86-17289
N86-17290
SAUNDERS, F. C. N86-18209
SAUNDERS, J. N86-17632
SAUNDERS, S. C. N86-17873
SAVALLE, S. N86-17356
SAWADA, K. N86-17296
SAYLORS, K. K. N86-17443
SCAHILL, J. W. N86-17752
SCHABBEHARD, H. W. N86-17763
SCHACHER, G. E. N86-17955
SCHADOW, K. C. N86-17400
SCHEBSDAT, F. N86-17519
SCHEER, D. N86-17386
SCHEPKIN, M. G. N86-18159
SCHIESS, J. R. N86-18060
SCHIJVE, J. N86-17345
N86-17807
SCHLAFKE, A. P. N86-17584
SCHLERETH, J. N86-18147
SCHMID, J. N86-17483
SCHMIDT, G. R. N86-17419
SCHMIDT, H. R. N86-17409
SCHOENMAN, L. N86-17387
SCHOFIELD, D. N86-17593
SCHROEDER, L. S. N86-18154
SCHULKE, A. W. N86-18170
SCHULTZ N86-17575
SCHULZE, W. N86-17694
SCHWAB, A. L. N86-17790
N86-17791
N86-17810
SCHWARZ, J. A. N86-18228
SCHWARZ, R. B. N86-17543
SCIANGULA, C. N86-17454
SCOTT-MONCK, J. N86-17863
SCOTT, A. M. N86-18209
SCOTT, R. F. N86-18028
SCOTT, T. R. N86-17462
SCUDDER, L. P. N86-17777
SEARLS, C. A. N86-17940
SEAVER, R. R. N86-17622
SEDLAK, J. N86-18151
SENS, J. C. N86-18140
SEPERS, A. N86-17448
SERCEL, J. C. N86-17423
N86-17429
SHANNON, J. D. N86-17909
N86-17913
SHAPIRO, N. N86-18010
SHAPIRO, S. M. N86-18213
SHAPIRO, W. N86-17408
SHARMA, R. N86-17389
SHEARMAN, M. N86-17974
SHELDON, P. N86-18216
SHELNUTT, J. A. N86-17978
SHEN, L. N86-18125
SHEPHERD, C. M. N86-17563
SHIEN, L. J. N86-17904
SHIMA, E. N86-17288
SHIMA, T. N86-18148
SHIMIZU, H. N86-18148
SHINOZUKA, M. N86-17934
SHINTON, Y. D. N86-17881

SHIRATORI, T. N86-17278
SHOJI, J. M. N86-17421
N86-17428
SHORT, S. A. N86-17796
SHORTENCARIER, M. J. N86-18018
SHREVE, S. E. N86-18103
SHU, D. N86-17714
SHULMAN, Z. P. N86-17500
SIEGEL, P. B. N86-18155
SIEGER, T. N86-17835
SIEVERS, A. J. N86-17732
SIGETY, P. N86-17488
SILVANI, J. P. N86-17328
SILVERBERG, L. M. N86-17373
SIMONEN, E. P. N86-17548
SIMONS, H. J. N86-18042
SINCLAIR, S. A. N86-17578
SINGH, B. N86-18101
SINGH, J. P. N86-17479
SINGH, K. N86-17662
SIWICKI, R. W. N86-17837
SKAPERDAS, G. N86-17511
SKUPNIEWICZ, C. E. N86-17955
SLATER, P. N. N86-17816
SLAVICH, A. L. N86-17907
SLEGEIR, W. N86-17511
SLOOFF, J. W. N86-17311
N86-17323
SMALLWOOD, D. O. N86-17797
SMETANA, J. N86-17368
SMILEY, V. N. N86-18181
SMITH, J. N86-17322
SMITH, R. B. N86-17928
N86-17929
SMITH, W. W. N86-17424
SNEAD, C. L., JR. N86-18220
SNIJDER, J. N86-17807
SOLAUN, S. N86-17855
SOLDAN, D. L. N86-17598
SOLOMON, A. D. N86-17884
SOMMEIJER, B. P. N86-18086
N86-18088
N86-18090
SONDERICKER, J. H. N86-17584
N86-17712
SONDHEIM, W. E. N86-17713
SOPER, D. E. N86-18143
SOUERS, P. C. N86-18152
SOVEY, J. S. N86-17425
N86-17426
SPALDING, D. B. N86-17687
N86-17688
N86-17689
N86-17690
SPEKREIJSE, S. P. N86-17696
SPENCER, R. R. N86-18198
SPENGLER, J. N86-17984
SPIELMAN, R. B. N86-18194
SPINKA, H. N86-18148
SPITZER, M. B. N86-17842
SPRUIJT, H. J. N. N86-17445
SQUILLANTE, M. R. N86-17879
SQUIRE, V. A. N86-17823
SROKOSZ, M. A. N86-18028
STACEY, W. M., JR. N86-18193
STADNIK, I. P. N86-17651
STAGGS, C. M. N86-17982
STAGMAN, J. M. N86-18177
STAHLI, G. N86-17744
STAMM, H. K. N86-17795
STAMMES, P. N86-18280
STANEK, R. N86-18148
STASIEWICZ, K. N86-17941
STEBBINS, R. J. N86-17770
STECCO, S. S. N86-17758
N86-17759
STECHMAN, R. C. N86-17398
STEENEKEN, H. J. M. N86-18131
STEENNIS, E. F. N86-17360
STEFAN, P. M. N86-17582
STEIN, R. P. N86-17674
STELLA, P. M. N86-17861
STEPANOV, B. M. N86-17643
STERMAN, G. N86-18143
STEUERWALT, M. N86-18053
STEWART, W. F. N86-17583
STIELL, W. N86-17483
STOLP, J. N86-17609
STOLTZFUS, J. M. N86-17387
STONER, G. D. N86-17981
STONER, G. E. N86-17478
STOTLER, D. P. N86-18202
STRANGE, K. L. N86-17380
STRATTON, R. C. N86-18052
STRAYER, M. R. N86-18137
STREET, R. N86-17904
STREETS, D. G. N86-17909
STROBEL, S. A. N86-17729
STROMBERG, G. F. N86-17401
STROOSNIJDER, L. N86-17609
STURGES, J. L. N86-17785
STURMAN, J. C. N86-17456
SUBRAHMANYAM, K. B. N86-17789
SUCHENTRUNK, R. N86-17482
SUGANO, K. N86-18147
SULLIVAN, D. N86-17467
SUMMERS, D. P. N86-17541
SUN, T. Y. N86-17661
SUNIER, J. W. N86-17713
SUSMAN, S. N86-18231
SUTTON, R. F. N86-17386
SUZUKI, A. N86-17280
SVENSSON, C. G. N86-17613
SVENSSON, T. N86-17725
SWANSON, D. G. N86-18199
SWARTZ, C. K. N86-17856
N86-17860
SWEETMAN, A. A. N86-18045
SWITHINBANK, C. W. M. N86-17817
SYDORA, R. D. N86-18201
SYN, C. K. N86-18185

T

TABOR, A. R. N86-18028
TACHIKI, M. N86-18229
TAGLIENTI, B. N86-18109
TAJIMA, T. N86-18201
TAKACS, P. Z. N86-17582
TAKAGI, T. N86-17282
TAKAHASHI, K. N86-18281
TAKANASHI, S. N86-17298
N86-17299
TAKI, S. N86-17283
TAN, A. N86-17956
TANENBAUM, A. S. N86-18251
TANG, S. Y. N86-18235
TANGUY, J. C. N86-17761
TANIDA, Y. N86-17278
TANS, P. P. N86-17710
TASTET, P. N86-17441
TATSUMI, S. N86-17299
TAYLOR, J. S. N86-18185
TEDALDI, B. N86-17366
TELFORD, J. W. N86-17703
TEMMA, T. N86-17287
TEMPELAAR, H. G. N86-17636
TENG, L. C. N86-18168
TERAESRANTA, H. N86-18261
N86-18269
TEREN, F. N86-17869
TERIELE, H. J. J. N86-18087
TERNES, M. P. N86-17885
TESCHNER, O. N86-18171
TESKEY, F. N. N86-18005
TESTA, M. N86-18080
TEVAARWERK, J. L. N86-17748
TEWELL, J. R. N86-17403
THANING, L. N86-17944
THEODORIDOU, E. N86-17471
THEUNISSEN, P. H. N86-17681
THEYS, J. N86-18257
THIESSEN, R. L. N86-17935
THOMA, P. N86-17592
THOMAS, D. M. N86-18200
THOMAS, J. R. E. N86-17601
THOMAS, R. H. N86-17817
THOMAS, U. N86-18171
THOMPSON, M. A. N86-17853
THOMPSON, S. N86-18070
THOMPSON, V. K. N86-17801
THORNE, J. M. N86-17624
THORP, T. L. N86-17618
THUNNISSEN, H. A. M. N86-17831
N86-17832
TIBSHIRANI, R. N86-18106
TICKNER, R. L. N86-17566
TIKHOMIROV, S. V. N86-17643
TIMM, R. N86-18130
TIMMERMANS, J. N86-18163
TITCHMARSH, J. M. N86-17563
TITUS, B. D. N86-18107
TJALLEMA, C. N86-18007
N86-18047
TORISEVA, M. N86-18263
TORNGREN, L. N86-17316
TOTH, L. M. N86-17570
TOURNIER, R. N86-18224
TOWN, G. G. N86-18052
TRAEGER, R. K. N86-17882
TRIVEDI, K. S. N86-18016
TROOST, G. K. N86-18205
TROTTSKIY, V. N. N86-17641
TRUAX, D. R. N86-18214
TRUMBLE, T. M. N86-17864
TSANG, F. Y. N86-18198
TSIRLIN, V. M. N86-17642
TSUGE, S. N86-17272
TUCK, R. A. N86-17632
TUFFIAS, R. H. N86-17399
TUFFS, P. S. N86-18054
N86-18055
TUOMINEN, I. N86-18259
TURNER, G. I. N86-17528
TURNER, J. E. N86-17505
TURNER, L. N86-17599
TYRRELL, J. N86-17513

U

UCHIDA, T. N86-17296
UHLMANN, D. R. N86-17491
N86-17561
N86-17562
ULANOVSKIY, M. V. N86-17647
ULBRICHT, T. E. N86-17397
ULLIAN, L. J. N86-17410
UMEAGUKWU, I. C. N86-17781
UNAL, M. F. N86-17304
UNDERWOOD, D. N86-18148
UNGSTRUP, E. N86-17946
UNK, J. N86-17894
URPO, S. N86-18258
N86-18260
N86-18266
N86-18269

V

VAGER, Z. N86-17715
VAILLARD, A. H. N86-17358
VALETON, J. M. N86-17986
N86-18187
VALTONEN, M. N86-18269
VANBAAL, J. B. J. N86-17325
VANCAMPEN, D. H. N86-17804
VANDELINDE, F. J. G. N86-17992
VANDENBAN, E. P. N86-18077
VANDENBERG, B. N86-17320
VANDENBERGHE, L. G. N86-17463
VANDENBOOM, A. J. W. N86-18095
VANDENDAM, R. F. N86-17349
VANDERBORGHT, B. N86-17897
VANDERBROECK, H. N86-17451
VANDERDRAAI, R. K. N86-18032
N86-18205
N86-18252
VANDERGEEST, P. J. N86-18030
VANDERGIESSEN, E. N86-18113
VANDERHA, J. C. N86-18082
VANDERHOOGT, P. J. M. N86-17804
VANDERHOUWEN, P. J. N86-18086
N86-18088
N86-18090
N86-18091
VANDERLAAN, P. C. T. N86-17360
VANDERLINDEN, H. H. N86-17809
VANDERLUBBE, J. C. A. N86-18084
VANDERVEGT, J. J. W. N86-17697
VANDERWERFF, K. N86-17790
N86-17792
N86-17793
VANDERWIJNGAART, R. F. N86-18205
VANDREUMEL, W. H. M. N86-17344
VANEGMOND, J. A. N86-17320
VANHAAFTEN, F. W. N86-17734
VANINGENSCHENAU, H. A. N86-17379
VANLEEUWEN, H. P. N86-17342
VANLEEUWEN, S. S. N86-17352
VANLOON, A. J. N86-17360
N86-17636
N86-17924
VANMIDDENDORP, H. N86-17992
VANMIEGROET, H. N86-17911
VANNORREN, D. N86-17723
VANPOPTA, R. G. N86-17962
VANSCHAIJK, P. N86-18048
VANSTOKKOM, H. N86-17722
N86-17829
VANWAKEREN, J. H. A. N86-17924
VANWOERKOM, P. T. L. M. N86-17376
VAROLI, V. N86-17459
VASHISHTA, P. N86-18226
VAUGHAN, M. F. N86-17701
VDOVIN, A. E. N86-17524

VELDMAN, A. E. P. N86-18031
VERBRUGGEN, T. W. N86-18205
VERWER, J. G. N86-18089
VEUGEN, L. M. M. N86-17828
VEUGEN, T. N86-17829
VEVE, M. A. N86-17996
VILLASENOR, F. R. N86-17690
VIRSHUP, G. F. N86-17845
VIRTANEN, H. N86-18259
VITANYI, P. M. B. N86-18037
VLIEGER, H. N86-17808
VOGELS, M. E. S. N86-18031
VOLIN, K. J. N86-18231
VONFINCKENSTEIN, K. G. F. N86-18204
VONKIENLIN, F. N86-17720
VOOK, R. W. N86-18228
VORIS, C. R. N86-17385
VOS, J. J. N86-17986
VRTIS, M. L. N86-18223
VULPIANI, A. N86-18239
VVEDENSKIYK, Y. N. N86-17653

W

WAGNER, A. P. N86-17452
WAGNER, M. N86-17850
WALCK, C. N86-18175
WALKER, A. N86-18276
WALLACE, J. R. N86-17506
WALRAVEN, J. N86-17994
WALTERS, D. M. N86-17834
WALTON, J. J. N86-17956
WALTON, O. R. N86-17794
WANG, C. S. N86-17757
WANG, J. J. H. N86-17597
WANG, Y. Y. N86-17292
WANKUM, D. N86-17628
WANLASS, M. N86-18219
WARD, R. A. N86-18281
WARE, R. E. N86-17628
N86-18115
WARNER, R. A. N86-18141
WARTSKI, L. N86-18158
WATANABE, H. N86-17730
WATSON, G. N86-17627
WATSON, R. D. N86-18195
WATTS, K. N. N86-17421
WEAVER, M. J. N86-17503
N86-17504
N86-17620
WEBB, J. W. N86-17911
WEBER, N. V. N86-17815
WEINBERG, I. N86-17856
WEIZER, V. G. N86-17843
WELSH, L. M. N86-17480
N86-17481
WENDT, J. F. N86-17680
WENDT, J. P. N86-17865
WERNER, U. N86-17518
WERTHEN, J. G. N86-17845
WEST, W. P. N86-18200
WESTE, G. N86-17694
WHALEN, M. V. N86-17425
N86-17426
WHEATLEY, C. J. N86-17899
WHILLANS, I. M. N86-17817
WHITAKER, G. D. N86-18008
WHITCOMB, B. M. N86-18181
WHITE, C. L. N86-17547
WHITELOCK, P. A. N86-18272
WHITLEY, J. B. N86-18195
WHITTAKER, J. W. N86-17772
WHITTET, D. C. B. N86-18274
WIESENBURG, D. A. N86-17970
WILKE, M. N86-18186
WILLEKENS, A. J. L. N86-17346
WILLIAMS, B. R. N86-17307
WILLIAMS, M. W. N86-17505
WILLIAMS, R. K. N86-17542
N86-17626
WILMS, A. N86-18160
WILSON, J. H. N86-18023
WILSON, K. J. N86-17400
WINCIERZ, P. N86-17558
WINER, A. M. N86-17927
WINSTANLEY, A. P. N86-17666
WINTERLING, G. N86-17893
WISE, J. F. N86-17840
WISEMAN, S. R. N86-18043
WITTE, D. R. N86-18001
WOJCIECHOWSKI, S. N86-18079
WOLLENSACK, E. N86-17894
WOOD, D. E. N86-18146
WOOD, W. M. N86-17392
WOODLE, M. N86-17714
WOODRUFF, R. K. N86-17893
WORLTON, T. G. N86-18222
WRIGHT, F. T. N86-18101
WRIGHT, J. D. N86-17578
WRIGHT, W. W. N86-17473
WU, K. C. N86-17584
WUESTEFELD, G. N86-18170
WUKELIC, G. E. N86-17935
WYETT, L. N86-17406

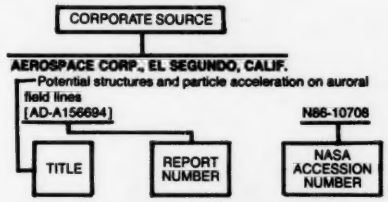
Y

YAAKOBI, B. N86-17742
YAKOVLEV, V. A. N86-17643
YAMADA, Y. N86-18213
YANA, V. N86-17350
YANCHEVA, M. N86-17499
YARLAGADDA, R. N86-17598
YATES, G. J. N86-18182
YATES, L. G. N86-18104
YEE, C. S. N86-17983
YEH, H. N86-17675
YEH, Y. C. M. N86-17852
YELYASKOVA, M. N86-17499
YETTER, H. H. N86-17754
YEZZI, C. A. N86-17384
YOON, S. Y. N86-17509
YOUNG, C. E. N86-17517
N86-17741
YOUNG, R. N86-17366
YU, K. F. N86-18108
YUAN-WU, F. N86-17444

Z

ZABRANSKY, B. J. N86-18144
ZAGORSKIY, Y. T. N86-17646
N86-17647
ZAITSEV, V. V. N86-17745
ZALENSKI, M. A. N86-17359
ZANELLO, L. N86-18172
ZANNER, F. J. N86-17751
ZAVITSANOS, P. D. N86-17535
ZDEBEL, U. N86-18233
ZENZ, H. P. N86-17333
ZHENG, S. B. N86-18200
ZIAEBRAHIMI, F. N86-17769
ZIPPERIAN, T. E. N86-18221
ZIRAH, J. N86-17576
ZISMAN, M. S. N86-17735
ZUCKER, J. I. N86-18034
ZULINSKI, R. E. N86-17615
ZUMINO, B. N86-18068
ZWALLY, H. J. N86-17817

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

AARHUS UNIV. (DENMARK).
Absolute wavelength measurement and fine structure determination in (7)Li 2
[DE85-018382] N86-18235

ADMIRALTY MARINE TECHNOLOGY ESTABLISHMENT, PORTSMOUTH (ENGLAND).
The evaluation of copper compounds as potential fuel biocides
[AMTE(M)-84520] N86-17974
Performance comparison of thirty, two-stage demand regulators
[ARE(M6)-TM-83818] N86-17987

AEG-TELEFUNKEN, WEDEL (WEST GERMANY).
Alternating currrent buses for low Earth orbits: A viable alternative N86-17435

AEROJET TACTICAL PROPULSION CO., SACRAMENTO, CALIF.
The 2.75 minimum signature barrage rocket N86-17393

AEROJET TECHSYSTEMS CO., SACRAMENTO, CALIF.
Orbital transfer vehicle engine integration study N86-17416

AERONAUTICAL RESEARCH INST. OF SWEDEN, STOCKHOLM.
Transonic wind tunnel tests of a swept supercritical wing-body model, PT 8
[FFA-TN-1982-24] N86-17316
An experimental investigation of supersonic flow over axisymmetric afterbodies with a centered propulsive jet at angles of attack
[FFA-TN-1985-10] N86-17317
A wind tunnel investigation of the effect of a propulsive jet on controls located on a conical afterbody in subsonic and supersonic free streams
[FFA-TN-1985-11] N86-17318

AEROSPACE CORP., EL SEGUNDO, CALIF.
Impregnant composition in dispenser cathodes
[AD-A160044] N86-17622

AEROSPACE CORP., LOS ANGELES, CALIF.
Two years of on-orbit gallium arsenide performance from the LIPS solar cell panel experiment N86-17862
Thermal stress cycling of GaAs solar cells N86-17865

AIR FORCE ENVIRONMENTAL TECHNICAL APPLICATIONS CENTER, SCOTT AFB, ILL.
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Richards-Gebaur AFB, Missouri
[AD-A159602] N86-17950
Limited Surface Observations Climatic Summary (LISOCS). Parts A, C-F: Maxwell AFB, Alabama
[AD-A159603] N86-17951
Limited surface observations climatic summary LISOCS. Gilze-Rijen, Netherlands
[AD-A159863] N86-17952
Revised Uniform Summary of Surface Weather Observations, Sparrevohn AFS, Alaska
[AD-A159864] N86-17953
Revised Uniform Summary of Surface Weather Observations, Pease AFB, New Hampshire
[AD-A159865] N86-17954

AIR FORCE WRIGHT AERONAUTICAL LABS., WRIGHT-PATTERSON AFB, OHIO.
The mechanical property data base from a cooperative program on first generation PM (Powder Metallurgy) aluminums
[AD-A159779] N86-17534
Future Air Force space power needs N86-17840
Testing of gallium arsenide solar cells on the CRRES vehicle N86-17864

ALCATEL THOMSON ESPACE, COURBEVOIE (FRANCE).
Application of current-control modulator (MC2) control feedback for 12 GHz 20 W Electric Power Conditioner (EPC) for Telecom satellite N86-17455

ALCATEL THOMSON ESPACE, TOULOUSE (FRANCE).
Influence of the bus regulation on telecommunication spacecraft power system and distribution N86-17467

ALLIED BENDIX CORP., KANSAS CITY, MO.
Robotic deburring: A bibliography
[DE85-015760] N86-17750
CAD-CAM database management at Bendix Kansas City
[DE85-017579] N86-18001

AMERICAN INST. FOR RESEARCH, WASHINGTON, D.C.
Forecasting device effectiveness. Volume 3: Analytic assessment of device effectiveness forecasting technique
[AD-A160029] N86-18104

AMES LAB., IOWA.
Rare earth chemical and physical metallurgy
[DE85-015536] N86-17537

AMSTERDAM UNIV. (NETHERLANDS).
Determination of spectral distributions and instrumental magnitudes of planets
[ESA-STR-214] N86-18280

APPLIED SOLAR ENERGY CORP., CITY OF INDUSTRY, CALIF.
Experience with OMCVD production of GaAs solar cells N86-17852

ARBEITSGEMEINSCHAFT DEUTSCHER VERKEHRSFLUGHAEFEN, STUTTGART (WEST GERMANY).
Activities report for the West German Civil Airports. Part 1: Text
[ISBN-3-87977-056-5-PT-1] N86-17326
Activities report for the West German civil airports. Part 2: Tables
[ISBN-3-87977-056-5-PT-2] N86-17327

ARDE, INC., MAHWAH, N.J.
Report on Kevlar -49 composite pressure vessel safety technology program N86-17412

ARGONNE NATIONAL LAB., ILL.
Development of refractory composites with improved fracture toughness
[DE86-000257] N86-17479
Laser spectroscopy of sputtered atoms
[DE85-018388] N86-17517
Damage-rate gradient effects on radiation-induced segregation and phase stability in irradiated alloys
[DE85-016605] N86-17540
Internal friction study of strain aging in alloys
[DE85-018367] N86-17543
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544
Chemical characterization of polyethylene resins and polyethylene gas pipe
[DE85-018346] N86-17573
Calculations of transient fields in the Felix experiments at Argonne using null field integrated techniques
[DE85-017617] N86-17599
Detailed design of a 13 kA 13 kV dc solid-state turn-off-switch
[DE85-013874] N86-17623
Heat transfer from a high temperature condensable mixture. 2: Sedimentation of fog condensate
[DE85-018377] N86-17673
Condensation of the underside of a horizontal surface in a closed vessel
[DE85-018379] N86-17674
MUPPATS: A multiparticle 3D imaging detector system
[DE85-018451] N86-17715
Excimer laser phototherapy for the dissolution of abnormal growth
[DE85-017803] N86-17741
Heat transfer in internal combustion engines
[DE85-011495] N86-17757
Climatological variability in the evaluation of cost effectiveness of emission control strategies to reduce acid deposition
[DE85-018375] N86-17909
Oxygen-18 study of the atmospheric-aquatic linkage in three Adirondack lake watersheds
[DE85-018355] N86-17912
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913
Protein mapping and the problem of complexity in molecular biology
[DE85-018349] N86-17979
A combination of artificial intelligence and procedural language programs in a computer application system supporting nuclear reactor operations
[DE85-007937] N86-18052
Development of passive acoustic imaging for large heat transfer components
[DE85-018384] N86-18126
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143
Model for charge state distributions of heavy Coulomb explosion fragment ions
[DE85-018363] N86-18144
Basic aspects of ion beam mixing
[DE85-018391] N86-18145
New results on Bhabha scattering at 29 GV
[DE85-018408] N86-18146
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
Status of the intense pulsed neutron source
[DE85-018387] N86-18170
Structure of high-pressure KNO3-4
[DE85-018361] N86-18222
Structural phase transition in CeCu6
[DE85-018362] N86-18223
New example of superconducting walls in the ferromagnet ErRh4B4
[DE85-018398] N86-18224
Systematic view of optical absorption spectra in the actinide series
[DE85-018406] N86-18225
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
Tricritical behavior in the ferromagnetic superconductor ErRh4B4
[DE85-018339] N86-18229
Inelastic scattering from amorphous solids
[DE85-018371] N86-18230
Disorder and transport in lithium/aluminum
[DE85-018389] N86-18231
Rhombohedral-to-triclinic phase transition in BaMo6S8
[DE85-018450] N86-18232
Databases and automated reasoning
[DE85-018348] N86-18247
Comment on an unusual event in the E594 detector from the direction of Cygnus X-3
[DE85-018341] N86-18278

ARIZONA STATE UNIV., TEMPE.
ABC's of pion charge exchange
[DE85-017531] N86-18155
ARIZONA UNIV., TUCSON.
Spectroradiometric calibration of the Thematic Mapper and multispectral scanner system
[E86-10022] N86-17816
ARKANSAS UNIV., LITTLE ROCK.
Effect of charge and aerodynamic properties of particles on electrified fabric filtration
[DE86-000013] N86-17628
Real-time measurement and calibration of particle charge: A comparison between DMA and E-SPART analyzer
[DE86-000019] N86-18115
ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Rock failure criteria for design of underground structural supports
[AD-A159807] N86-17932
ARNOLD ENGINEERING DEVELOPMENT CENTER, ARNOLD AIR FORCE STATION, TENN.
Development of a Two-Dimensional/Axisymmetric implicit Navier-Stokes solver using flux-difference splitting concepts and fully general geometry
[AD-A159776] N86-17667
ASTROSYSTEMS INTERNATIONAL, INC., NEWARK, DEL.
GaAsP on GaP top solar cells N86-17847
ATLANTIC RESEARCH CORP., GAINESVILLE, VA.
Thrust vector technology demonstration N86-17384
AUBURN UNIV., ALA.
Experimental studies of radio frequency waves and confinement in the Auburn Torsatron
[DE85-017189] N86-18199
AVIONS MARCEL DASSAULT-BREGUET AVIATION, SAINT-CLOUD (FRANCE).
Physical chemical tests and feasibility study of the Ciba-Geigy R6376 IM6 prepreg
[DGT-26.749] N86-17484
Evaluation of the Ciba-Geigy R6376 IM6 prepreg
[DGT-26.649] N86-17485
Study of composite material curing molds
[DGT-26.817] N86-17486
Statistics on the basic characteristics of carbon epoxy composites
[DGT-27.039] N86-17487
Metallurgical and assembling fatigue characterization of the alloys 2214T451, 7010T73651 and 2024T351 in plates (50 to 70 mm, 120 to 125 mm) and in thick forged bars
[DGT-25.919] N86-17552

B

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
Analysis of a gas generator system N86-17391
Analysis of a gas generator system
[AD-A156999] N86-17749
BATTELLE MEMORIAL INST., ARGONNE, ILL.
Southeastern Regional geologic characterization report. Volume 3: Plates
[DE86-000416] N86-17822
Northeastern regional geologic characterization report, volume 1
[DE86-000406] N86-17936
Northeastern Regional geologic characterization report. Volume 2: Appendixes
[DE86-000408] N86-17937
Northeastern regional geologic characterization report. Volume 3: Plates
[DE86-000418] N86-17938
North Central regional geologic characterization report. Volume 2: Plates
[DE86-000419] N86-17939
BETTIS ATOMIC POWER LAB., WEST MIFFLIN, PA.
TRANSL: A subroutine library for PATRAN-G translators
[DE85-017634] N86-18020
BLUFFTON COLL., OHIO.
New delayed neutron precursors measured at TRISTAN
[DE85-017918] N86-18141
BOEING AEROSPACE CO., SEATTLE, WASH.
IUS propulsion status N86-17415
The effect of engine design characteristics on orbital transfer vehicle performance N86-17419
Burst annealing of electron damage in silicon solar cells N86-17853
Photon radiation effects on CdS/CuInSe2 thin film solar cells N86-17857
Space Environment Workshop N86-17871
BRIGHAM YOUNG UNIV., PROVO, UTAH.
Physical and chemical characterization of multilayered structures
[DE85-016922] N86-17624
BRIGHTON POLYTECHNIC (ENGLAND).
Novel computer architectures for data storage and retrieval
[BLRDR-5845] N86-18005
BRITISH AEROSPACE AIRCRAFT GROUP, PRESTON (ENGLAND).
Hot Gas Laboratory twin nozzle calibration
[BAE-ARG-200] N86-17666
BRITISH AEROSPACE DYNAMICS GROUP, STEVENAGE (ENGLAND).
Spacecraft Orbital Power Evaluation (SCOPE) N86-17442
Time domain analysis of an S3R system N86-17463
BRITISH COLUMBIA UNIV., VANCOUVER.
Photovoltaic array simulation N86-17449
BRITISH LIBRARY LENDING DIV., BOSTON SPA (ENGLAND).
Enhancing the impact toughness of low alloy steel by micro-alloying and modification
[BLL-M-36490-(5828.4)] N86-17522
Influence of boron on dendrite structure of cast metal
[BLL-M-36491-(5828.4)] N86-17523
Powder metallurgy: Technology and equipment
[BLL-M-36380-(5828.4)] N86-17524
Shape and depth of the crystallisation front in steel ingots remelted by the electroslag method determined with the aid of radioactive phosphorus
[BLL-DRIC-T-TR-7561-(3623.66)] N86-17525
Possibilities of protection from abrasive and adhesive wear
[BLL-RISLEY-TR-5166-(9091.9F)] N86-17744
Upsetting of viscoplastic medium between two rigid plates in presence of friction
[BLL-M-36390-(5828.4)] N86-17745
A method of fabricating silicon carbide mouldings
[BLL-RISLEY-TR-5206-(9091.9F)] N86-17747
Vibrational stability behaviour of orthotropic plates in steel roads bridges: Application for financial support of a research project by the ECSC (European Coal and Steel Community)
[BLL-TRANS-3225-(9057.2451)] N86-17778
Estimation of flaw size in ultrasonic testing of welds in unalloyed and low-alloy steels
[BLL-RISLEY-TR-5229-(9091.9F)] N86-17782
Fatigue in a welded join made by pulsed MIG welding of a 304 type stainless steel
[BLL-RISLEY-TR-5233-(9091.9F)] N86-17783
Static and fatigue strength of explosion welded plates
[BLL-RISLEY-TR-5232-(9091.9F)] N86-17784
Continuous measurement of sodium aerosols in the air N86-17894
BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Low temperature methanol synthesis catalyst and process development
[DE85-017837] N86-17511
Survey of chemical speciation of trace elements using synchrotron radiation
[DE85-017850] N86-17516
Sputter deposition system for controlled fabrication of multilayers
[DE85-017521] N86-17582
Operational tests of the BNL 24.8 kW, 3.8 K helium refrigerator
[DE85-017851] N86-17584
UHV piezoelectric translator
[DE85-018201] N86-17627
Precision cryogenic temperature data acquisition system
[DE85-017847] N86-17712
High flux photon beam monitor
[DE85-018202] N86-17714
New delayed neutron precursors measured at TRISTAN
[DE85-017918] N86-18141
Quark dynamics of N anti N annihilation
[DE85-017508] N86-18153
Large magnetic spectrometer group
[DE85-017512] N86-18154
First order phase transformations: Scaling relations for grain self-correlation functions
[DE85-017509] N86-18213
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220
BROWN UNIV., PROVIDENCE, R. I.
Theoretical studies of Resonance Enhance Stimulated Raman Scattering (RESRS) of frequency doubled Alexandrite laser wavelengths in cesium vapor
[NASA-CR-176464] N86-17731
BUNDESANSTALT FUER FLUGSICHERUNG, FRANKFURT AM MAIN (WEST GERMANY).
Activities in air traffic control N86-17331
Environment-friendly propeller aircraft with a maximum weight of 5700 kg, and motor gliders: Publication of the noise values N86-17341
Instructions for flight crew members and flight crew training and examination guidelines of the West German Federal Board of Transport
[REPT-1] N86-17985
BUNDESMINISTERIUM DES INNERN, BONN (WEST GERMANY).
Evaluation of functional experience with safety valves
[BMI-1985-080] N86-17760

C

CALIFORNIA INST. OF TECH., PASADENA.
Visibility model verification by image processing techniques
[PB85-222800] N86-17925
CALIFORNIA UNIV., BERKELEY.
Development of an accurate algorithm for exp(Bt)
[AD-A160060] N86-18015
CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Hyperfine fields in Fe-Ni-X alloys and their application to a study of tempering of 9Ni steel
[DE85-011517] N86-17538
Improved fiberoptic spectrophotometer
[DE85-017792] N86-17710
High flux photon beam monitor
[DE85-018202] N86-17714
Collective effects and lattice implications for an FEL bypass ring
[DE85-016563] N86-17735
Slow crack growth: Macroscopic and microscopic aspects
[DE85-011165] N86-17798
Magnetic charge and non-associative algebras
[DE85-009931] N86-18068
Compound nucleus studies with reverse kinematics
[DE85-016630] N86-18138
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
High temperature experiment for accelerator inertial fusion
[DE85-016553] N86-18191
CALIFORNIA UNIV., IRVINE.
Theoretical investigations of metal surfaces N86-18206
CALIFORNIA UNIV., LOS ANGELES.
Low cost voice compression for mobile digital radios
[NASA-CR-176490] N86-17594
CALIFORNIA UNIV., RIVERSIDE.
Atmospheric fates of organic chemicals: Prediction of ozone and hydroxyl radical reaction rates and mechanisms
[PB85-241529] N86-17927
CALIFORNIA UNIV., SAN DIEGO.
Calculating radar detection probabilities by contour integration N86-17590
Integrated optoelectronic circuits and their modular designs for residue number computation N86-17614
Crossing channel waveguide electro-optic modulators N86-18176
CALIFORNIA UNIV., SANTA BARBARA.
Reaction enhancement of heterogeneously catalyzed reactions by concentration forcing
[DE86-000220] N86-17514
Markov tree model of transport in area preserving maps
[DE86-000237] N86-18238
CALSPAN FIELD SERVICES, INC., ARNOLD AFS, TENN.
Development of a Two-Dimensional/Axisymmetric implicit Navier-Stokes solver using flux-difference splitting concepts and fully general geometry
[AD-A159776] N86-17667
CAMBRIDGE UNIV. (ENGLAND).
Activities report of the Department of Engineering N86-18255
CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Low Reynold's number boundary layers in a disturbed environment
[NASA-CR-175031] N86-17665
CENTER FOR MATHEMATICS AND COMPUTER SCIENCE, AMSTERDAM (NETHERLANDS).
Multigrid solution of the steady Euler equations
[CWI-NM-R8505] N86-17696
Algebraic definition of a simple programming language
[CWI-CS-R8504] N86-18033
Transition systems, infinitary languages and the semantics of uniform concurrency
[CWI-CS-R8506] N86-18034

The efficiency of the Equation Interpreter compared with the University of New Hampshire (UNH) Prolog interpreter
[CWI-CS-R8509] N86-18035

Infinite streams and finite observations in the semantics of uniform concurrency (preliminary version)
[CWI-CS-R8508] N86-18036

Time-driven algorithms for distributed control
[CWI-CS-R8510] N86-18037

Point-line characterizations of buildings
[CWI-PM-R8415] N86-18076

On the holomorphic continuation of the Iwasawa and a related decomposition
[CWI-PM-R8502] N86-18077

Stability, multiplicity and global continuation of symmetric periodic solutions of a nonlinear Volterra integral equation
[CWI-AM-R8502] N86-18078

Numerical integration of retarded differential equations with periodic solutions
[CWI-NM-R8502] N86-18086

Computation of all the amicable pairs below 10 billion
[CWI-NM-R8503] N86-18087

Explicit Runge-Kutta (-Nystroem) methods with reduced phase errors for computing oscillating solutions
[CWI-NM-R8504] N86-18088

Convergence and order reduction of diagonally implicit Runge-Kutta schemes in the method of lines
[CWI-NM-R8506] N86-18089

Predictor-corrector methods for periodic second-order initial value problems
[CWI-NM-R8509] N86-18090

Discretization of hyperbolic differential equations with periodic solutions
[CWI-NM-R8510] N86-18091

Syntax and defining equations for an interrupt mechanism in process algebra
[CWI-CS-R8503] N86-18092

Implementation of a new primality test
[CWI-CS-R8505] N86-18093

On the consistency of Koomen's fair abstraction rule
[CWI-CS-R8511] N86-18094

A distributed file service based on optimistic concurrency control
[CWI-CS-R8507] N86-18251

CENTRAL ELECTRICITY GENERATING BOARD, LONDON (ENGLAND).

On recovery of platinum from spent catalysts
[CE-TRANS-8042] N86-17499

CENTRAL ELECTRICITY RESEARCH LABS., LEATHERHEAD (ENGLAND).

Fluid modeling of flow and dispersion in the atmosphere: Facilities and techniques N86-17902

Fluid modeling of flow and dispersion in the atmosphere: Historical notes N86-17903

CENTRE D'ESSAIS AERONAUTIQUE TOULOUSE (FRANCE).

Elementary characterization of the Rigidite 5245C/IM6 preimpregnated carbon from NARMCO U.S., test report M3-449000, part 2
[PV-M3-449000-PT-2] N86-17489

Physical chemical characterization tests of the 5245C NARMCO preimpregnation resin, test report M3-449000, part 1
[PV-M3-449000-PT-1] N86-17490

Dose of PES (plasticizer) in a BSL914 resin using different standards
[CEAT-NT-15/M/85] N86-17521

Influence of corrosion pits and environmental moisture on the fatigue behavior of 35 NCD 16 THR-ESR
[M3-450900] N86-17555

Study of the influence of pitting corrosion on the fatigue characteristics of Marvac 18
[M2-666500] N86-17556

CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE (FRANCE).

Digital structure of an autopiloting for asynchronous machine fed by Pulse Width Modulation (PWM) converter N86-17438

Analysis of a particular working mode of S3R type regulator N86-17441

Structural responses in a random environment
[CNES-NT-115] N86-17800

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, GRENOBLE (FRANCE).

New example of superconducting walls in the ferromagnet ErRh4B4
[DE85-018398] N86-18224

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, TOULOUSE (FRANCE).

Study of a resonant converter using power transistors in a 25 kW X-ray tube power supply N86-17466

CENTRE TECHNIQUE DES INDUSTRIES MECANIQUES, NANTES (FRANCE).

Influence of the present practice of heat straightening of thick steel plates (over 20 mm) on the mechanical properties
[CETIM-100-840] N86-17560

Study on the measuring of polymer rheological properties by adapting an injection molding machine
[CETIM-5-650-06] N86-17574

CENTRE TECHNIQUE DES INDUSTRIES MECANIQUES, SENLIS (FRANCE).

Modification of vulcanized elastomer surfaces to diminish adherence to metals
[CETIM-100340] N86-17575

Slow motor: ISO round robin tests
[CETIM-N-01270] N86-17587

Liquid flow calibration
[CETIM-15-C-251] N86-17691

Tool wear monitoring systems
[CETIM-100560] N86-17761

High speed steel working tools
[CETIM-102360] N86-17762

CENTRE TECHNIQUE DES INDUSTRIES MECANIQUES, ST. ETIENNE (FRANCE).

Applications of microalloyed steels to stamping
[CETIM-13-K-301] N86-17557

The hardening of technical adhesives
[CETIM-101370] N86-17576

Hoops
[CETIM-13-N-243] N86-17767

Assembling with use of permanent deformation
[CETIM-13-N-283] N86-17812

CENTRO INFORMAZIONI STUDI ESPERIENZE, MILAN (ITALY).

Contribution to the interpretation of Slow Strain Rate Technique (SSRT) strain rate effect on Boiling Water Reactor (BWR) AISI 304SS IGSCC
[CISE-2604] N86-17799

Physiochemical transformation of radioactive nuclei in water environments
[CISE-2694] N86-17914

CHALMERS UNIV. OF TECHNOLOGY, GOETEBORG (SWEDEN).

Harmonic analysis and partial differential equations
[CTH-MATH-1985-03] N86-18062

Dirichlet problem for Lipschitz domain. The setup N86-18063

CHEVRON RESEARCH CO., RICHMOND, CALIF.

Vacuum MOCVD fabrication of high efficience cells N86-17848

CHIBA UNIV. (JAPAN).

Supersonic flow on axisymmetric blunt body N86-17268

CHRISTIAN ROVSING LTD., COPENHAGEN (DENMARK).

Design and development of a pyrotechnique arming and firing unit N86-17465

CIAD, ZOETERMEER (NETHERLANDS).

Test of Applicon Bravo
[A-13] N86-18007

Test of Intergraph
[A-11] N86-18047

Test of Superdraft
[A-12] N86-18048

CINCINNATI UNIV., OHIO.

A study of high Reynolds number laminar separation N86-17302

CITY COLL. OF THE CITY UNIV. OF NEW YORK.

Spectral and temporal properties of the alpha and beta subunits and (alpha beta) monomer isolated from Nostoc sp. using picosecond laser spectroscopy N86-17728

CLARK UNIV., WORCESTER, MASS.

Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

CLARKE AMBROSE, INC., KNOXVILLE, TENN.

Human-machine interfaces for teleoperators: An overview of research and development at the Oak Ridge National Laboratory. Consolidated Fuel Reprocessing Program
[DE85-017713] N86-17990

CLARKSON UNIV., POTSDAM, N.Y.

finite element analysis of transient forced convection and conjugate heat transfer N86-17660

COLORADO STATE UNIV., FORT COLLINS.

Absolute wavelength measurement and fine structure determination in (7)Li 2
[DE85-018382] N86-18235

COMMISSARIAT A L'ENERGIE ATOMIQUE, PARIS (FRANCE).

Separation of a gas from a gas mixture
[DE85-018296] N86-17512

COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).

Controlled Impact Demonstration (CID)
[GPO-46-870] N86-17324

Results of space shuttle flight 51-A
[GPO-44-770] N86-17367

COMMUNICATIONS SATELLITE CORP., CLARKSBURG, MD.

Power requirements for commercial communications spacecraft N86-17868

CONNECTICUT UNIV., STORRS.

Horseshoe vortex formation around a cylinder N86-17658

COPENHAGEN UNIV. (DENMARK).

Quantum resonances in physical tunneling
[DE85-017558] N86-18214

CORNELL UNIV., ITHACA, N.Y.

Development of solid state vibrational lasers
[AD-A159817] N86-17732

D

DANISH METEOROLOGICAL INST., COPENHAGEN.

Experiences with the Declination-Inclination (DI) fluxgate magnetometer including theory of the instrument and comparison with other methods
[DMI-GEOPHYS-PAPERS-R-71] N86-17727

Solar wind control of the polar cusp
[DMI-GEOPHYS-PAPERS-B-72] N86-18283

DANISH SPACE RESEARCH INST., LYNGBY.

Waves with harmonic structure below and above the Lower Hybrid Resonance (LHR) observed on the Cleft Energetics Transport and Ultraviolet Radiation (CENTAUR) 35.001 and 35.002 rockets
[DRI-2-85] N86-17946

DELAWARE UNIV., NEWARK.

N/P GaAs concentrator solar cells with an improved grid and bushbar contact design N86-17844

DENVER RESEARCH INST., COLO.

Sample conditioning and standard preparation for synfuel gas analysis
[DE85-010073] N86-17506

DEPARTMENT OF ENERGY, OAK RIDGE, TENN.

Energy Data Base: Introduction to content and structure, revision 1
[DE84-017165] N86-18244

DEPARTMENT OF ENERGY, WASHINGTON, D. C.

Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625

Method for sensing and measuring a concentration or partial pressure of a reactant used in a redox reaction
[DE85-017740] N86-17630

Magnetically focused liquid drop radiator
[DE85-017735] N86-17671

Gated strip proportional detector
[DE85-017757] N86-17708

Recirculating cross-correlation detector
[DE85-017782] N86-17709

Improved fiberoptic spectrophotometer
[DE85-017792] N86-17710

Microwave detector
[DE85-017797] N86-17711

Density gradient free electron collisionally excited X-ray laser
[DE85-017726] N86-17739

Apparatus for laser beam profile measurements
[DE85-017789] N86-17740

Excimer laser phototherapy for the dissolution of abnormal growth
[DE85-017803] N86-17741

Fluidizing device for solid particulates
[DE85-006504] N86-17752

Multi-port valve assembly
[DE85-017769] N86-17753

Machine imparting complex rotary motion for lapping a spherical inner diameter
[DE85-017790] N86-17754

Transmissive metallic contact for amorphous silicon solar cells
[DE85-017724] N86-17880

Composite materials for thermal energy storage
[DE85-017743] N86-17881

Electrochemical storage and conversion: Batteries and fuel cells
[DE85-018177] N86-17886

Method for improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system
[DE85-017723] N86-17978

Optical switch
[DE85-017783] N86-18184

Method of synthesizing and growing copper-indium-diselenide (CuInSe2) crystals
[DE85-017729] N86-18215

Process for selectively patterning epitaxial film growth on a semiconductor substrate
[DE85-017733] N86-18216

Improved method of preparing p-i-n junctions in amorphous silicon semiconductors
[DE85-017736] N86-18217
Narrow band gap amorphous silicon semiconductors
[DE85-017753] N86-18218
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219

DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
Regulatory aspects of commercial, space transportation N86-17409

DESERT RESEARCH INST., RENO, NEV.
Evaluation of data obtained from atmospheric laser Doppler velocimeter
[NASA-CR-178474] N86-17703

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK (WEST GERMANY).
Construction of a measuring method using fiber optics and an LTN-90 laser gyro strapdown system for BO-195 helicopters
[DFVLR-MITT-85-10] N86-17333

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN (WEST GERMANY).
A synthetic aperture radar system simulation model: SARSIM
[DFVLR-MITT-85-11] N86-17607
Some aspects of the atmospheric radiance model of LOWTRAN 6
[DFVLR-FB-85-33] N86-17945

DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN (WEST GERMANY).
Field test of an autonomous wind-diesel power plant
[BMFT-FB-T-85-092] N86-17892

DREXEL UNIV., PHILADELPHIA, PA.
Ultrasonic feature mapping for anomaly identification in composite materials and adhesively bonded structures N86-17771

DUKE UNIV., DURHAM, N. C.
Performance and reliability analysis using directed acyclic graphs
[AD-A160313] N86-18016

DYNAFLOW SOFTWARE SYSTEMS B.V., AMSTERDAM (NETHERLANDS).
Software quality metrics of the Faint Object Camera (FOC) image processing software
[ESA-CR(P)-2039] N86-17716

E

EAGLE-PICHER INDUSTRIES, INC., JOPLIN, MO.
Research, development, and demonstration of nickel-iron batteries for electric vehicle propulsion
[DE86-000520] N86-17629

ECOLE NATIONALE SUPERIEURE DES TELECOMMUNICATIONS, PARIS (FRANCE).
Local network interconnection through a satellite point to multipoint link
[ENST-85E007] N86-17369
Contributions to combination coding: Sum ordering and covering radius
[ENST-85E002] N86-17600
Activities report of the Department of Systems and Communications, CNRS-UA 820
[ENST-85D002] N86-17611
Codes for write-once memories
[ENST-84D004] N86-18027
On the prediction and the spectral factorization of stationary processes in the broad sense with two discrete parameters
[ENST-85C002] N86-18074
Waveform vector quantization: The algebraic approach
[ENST-85C004] N86-18096
Propositions to implement a computerized private document retrieval system. Presentation of the Personalized Documentation Aid Tool (OPAD)
[ENST-85E001] N86-18248

EDGERTON, GERMESHAUSEN AND GRIER, INC., LOS ALAMOS, N. MEX.
Imaging techniques utilizing optical fibers and tomography
[DE85-017536] N86-18186

EDGERTON, GERMESHAUSEN AND GRIER, INC., SANTA BARBARA, CALIF.
Imaging techniques utilizing optical fibers and tomography
[DE85-017536] N86-18186

EG AND G ENERGY MEASUREMENTS, INC., LAS VEGAS, NEV.
Applications of fiber optic couplers to diagnostic experiments at the Nevada Test Site
[DE85-016787] N86-18181

ELECTRICITE DE FRANCE, CHATOU.
Numerical techniques and dispersion modeling N86-17898

ELEKTROSCHMELZWERK KENPTEN G.M.B.H., MUNICH (WEST GERMANY).
Development of silicon nitride materials for casting of solar cell silicon
[BMFT-FB-T-85-069] N86-17577

ENGINEERING SCIENCES DATA UNIT, LONDON (ENGLAND).
Estimation of drag due to inoperative turbo-jet and turbo-fan engines using data item nos. 81009 and 84004
[ESDU-84005] N86-17305
Estimation of sideforce, yawing moment and rolling moment derivatives due to rate of yaw for complete aircraft at subsonic speeds
[ESDU-84002] N86-17357
Fluid transients in pipes. Reduction and control of pressure surges in liquids
[ESDU-84013] N86-17663
Low-fin staggered tube banks: Heat transfer and pressure-loss for turbulent single-phase crossflow
[ESDU-84016] N86-17664
Wind speed profiles over terrain with roughness changes for flat or hilly sites
[ESDU-84011-A] N86-17949
Nonlinear systems: An introduction to describing functions
[ESDU-84009] N86-18058

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

ESSEX CORP., ORLANDO, FLA.
Plan fo: evaluation of the training potential of helmet-mounted display and computer-generated synthetic imagery
[AD-A160299] N86-17705

EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Proceedings of ESA sessions at the 16th IEEE Annual Power Electronics Specialists Conference
[ESA-SP-230] N86-17432
A program for International Polar Oceans Research (PIPOR)
[ESA-SP-1074] N86-17972
Ad astra HIPPARCOS. The European Space Agency's astrometry mission
[ESA-BR-24] N86-18282

EUROPEAN SPACE AGENCY. EUROPEAN SPACE OPERATIONS CENTER, DARMSTADT (WEST GERMANY).
An outline of the practical use of Lie series
[ESA-STR-215] N86-18082

EUROPEAN SPACE AGENCY. EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, ESTEC, NOORDWIJK (NETHERLANDS).
Measurement of thermo-optical properties of thermal control materials
[ESA-PSS-01-709-ISSUE-1] N86-17375
MARECS and ECS: The first few years in orbit N86-17433
The ERS-1 power system N86-17437
Temperature derivative battery charge control N86-17445
The results of some end of life tests on the OTS battery N86-17448
Discharge detection in high voltage flight hardware N86-17457
Determination of the susceptibility of silver-plated copper wire/cable to red plague corrosion
[ESA-PSS-01-720-ISSUE-1] N86-17554
The ESA preferred parts list
[ESA-PSS-01-603] N86-17634

F

FABRICA ITALIANA APPARECCHI RADIO S.P.A., MILAN (ITALY).
The Giotto power supply subsystem N86-17436
The 230W Traveling Wave Tube Amplifier (TWTA) power supply design N86-17453

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
A comparison of postmortem coronary atherosclerosis findings in general aviation pilot fatalities
[AD-A159811] N86-17982

FERMI NATIONAL ACCELERATOR LAB., BATAVIA, ILL.
New and old accelerators: What can they do for astrophysics
[DE85-013220] N86-18165
Low level RF system for the Fermilab Tevatron
[DE85-017440] N86-18166
Programmable high power beam damper for the Tevatron
[DE85-017441] N86-18167
Proposals for synchrotron light sources
[DE85-017444] N86-18168

FERRANTI LTD., BRACKNELL (ENGLAND).
Analogue SAR signal processing: Architecture and technology
[REPT-3881-ISSUE-1-VOL-2] N86-17601

FLORENCE UNIV. (ITALY).
Quasi three-dimensional finite element flow calculation in pumps N86-17678
Flow calculation in pump impellers by finite elements N86-17679
Gas turbines in cogeneration: Overall analysis and numerical predictions N86-17758
A rational efficiency analysis of comparisons and trends in gas turbines for cogeneration N86-17759

FLORIDA UNIV., GAINESVILLE.
Evaluation of AlsubxGasub1-xsubAs solar cells N86-17846
DLTS analysis of radiation-induced defects in one-MeV electron irradiated germanium and Alsub0.17Gasub0.83As solar cells N86-17858

FONDAZIONE UGO BORDONI, ROME (ITALY).
Report on the joint activities of the Ugo Bordoni Foundation and the Istituto Superiore delle Poste e delle Telecomunicazioni N86-17603

FORD AEROSPACE AND COMMUNICATIONS CORP., PALO ALTO, CALIF.
Flight experience with an integrated bipropellant propulsion system: INSAT 1 N86-17431

FORSCHUNGSINSTITUT DER DEUTSCHEN BUNDESPOST, DARMSTADT (WEST GERMANY).
A model for the analysis of orthogonal modulation methods for digital transmission
[FI-445-TBR-23] N86-17602
The power spectral density of the HDB2 and the HDB3 coded signals
[FI-44-TBR-96] N86-17608

FRAUNHOFER-INST. FUER FESTKOERPERTECHNOLOGIE, MUNICH (WEST GERMANY).
Analysis of dielectric layers for Very Large Scale Integration (VLSI) applications, especially the influence of stoichiometry and hydrogen content on the properties of plasma nitride layers
[BMFT-FB-T-85-059] N86-17635
Development of sensors on the basis of polycrystalline silicon
[BMFT-FB-T-85-068] N86-17720

FRAUNHOFER-INST. FUER ZERSTOERUNGSFREIE PRUEFVERFAHREN, SAARBRUECKEN (WEST GERMANY).
A concept for the quality assurance of ceramic gas turbine components using nondestructive tests
[BMFT-FB-T-85-094] N86-17773

FUJI HEAVY INDUSTRIES LTD., UTSUNOMIYA (JAPAN).
Application of computational aerodynamics to wing design N86-17297

FUKUI UNIV. (JAPAN).
Numerical simulation method for combustion in an oxyhydrogen rocket motor N86-17283

G

GA TECHNOLOGIES, INC., SAN DIEGO, CALIF.
Simultaneous measurement of current and plasma density profiles in the TEXT Tokamak
[DE85-017679] N86-18200

GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
Installation of automated weather observing systems by FAA (Federal Aviation Administration) at commercial airports is not justified
[PB85-241347] N86-17964

GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF.
Orbital transfer vehicle engine integration study N86-17416

GENERAL ELECTRIC CO., PHILADELPHIA, PA.
Self-propagating reactions for synthesis of high temperature materials
[AD-A159869] N86-17535

GENERAL ELECTRIC CO., SAN JOSE, CALIF.
Development of passive acoustic imaging for large heat transfer components
[DE85-018384] N86-18126

GENERAL ELECTRIC CO. LTD., WEMBLEY (ENGLAND)
Improved blue response CCD-MA357 detectors
[GEC-16,879C] N86-17718

GEOLOGICAL SURVEY, HARRISBURG, PA.
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837

GEOLOGICAL SURVEY, LANSING, MICH.
Water resources data for Michigan, water year 1984 [PB85-237741] N86-17835
GEOLOGICAL SURVEY, OKLAHOMA CITY, OKLA.
Water resources data for Oklahoma, water year 1983 [PB85-236289] N86-17834
GEOLOGICAL SURVEY, RICHMOND VA.
Water resources data for Virginia water year 1984 [PB85-242105] N86-17836
GEORGIA INST. OF TECH., ATLANTA.
A study of the spiraphase and anisotropic substrates in microstrip antennas [AD-A159862] N86-17597
Calculations of transient fields in the Felix experiments at Argonne using null field integrated techniques [DE85-017617] N86-17599
Analysis of the unbalanced NBI rotation experiments in the ISX-B, PLT and PDX Tokamaks [DE85-017616] N86-18193
Correlation and collective modes in narrow band materials [AD-A160310] N86-18210
GRONINGEN RIJKSUNIVERSITEIT (NETHERLANDS).
Efficiency calculation for gas turbines: Searching for simple relations between thermodynamic efficiency of a gas turbine and efficiency determining parameters [SS-44] N86-17786
Predicting windspeed: A system theoretical approach [REPT-49] N86-17961
Algorithmic orbit classification for connected solvable groups [ZW-8411] N86-18072

H

HAMPTON INST., VA.
Intense excitation source of blue-green laser [AD-A160303] N86-17733
HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
Simulation in computer assisted instruction [DE85-018208] N86-18026
HARVARD SCHOOL OF PUBLIC HEALTH, BOSTON, MASS.
Assessment of individual human exposures to ozone in a health study [PB85-245975] N86-17984
HARVARD UNIV., BOSTON, MASS.
Expedient methods of respiratory protection. 3: Submicron particle tests and summary of quality factors [TI85-018278] N86-17983
HASLER LTD., BERN (SWITZERLAND).
Power switching cell modeling: An easy way N86-17460
HELSINKI UNIV. (FINLAND).
Cyclic mean flows in the Sun as a probe of the dynamo action N86-18259
Comparison of optical extinction and molecular line intensities in the Chamaeleon 1 dark cloud N86-18263
Correlated variability in the W49N water maser source N86-18264
Computers at the Metsaehovi (Finland) radio research station N86-18265
Red shift radiation: A major electromagnetic radiation measurement N86-18270
HELSINKI UNIV. OF TECHNOLOGY, ESPOO (FINLAND).
A study of the back-and-forth shooting method [REPT-A-3] N86-18073
Proceedings of the 19th Finnish Astronomers' Days [REPT-S-162] N86-18258
Results of solar research studies at the Metsaehovi (Finland) radio research station N86-18260
Solar 160 min oscillation at microwave N86-18261
Analog to digital (A/D) conversion at the Metsaehovi (Finland) Radio Research Station N86-18266
Cryogenic millimeter wave receiver for the Metsaehovi radio telescope N86-18267
Observations of extragalactic radio sources at 8 and 13.5 mm N86-18269
HERCULES, INC., MAGNA, UTAH.
Bouyant flow and its effect on internal insulation performance: Numerical approach N86-17388
HUGHES AIRCRAFT CO., CANOGA PARK, CALIF.
Fast cook-off tests of the AMRAAM air vehicle N86-17389
HUNTING GEOLOGY AND GEOPHYSICS LTD., BOREHAM WOOD (ENGLAND).
Study of a land use of synthetic aperture radar, executive summary [ESA-CR(P)-2067-VOL-1] N86-17825
Study of a land use of synthetic aperture radar. Volume 1: Main report [ESA-CR(P)-2067-VOL-2] N86-17826
HUNTSVILLE HOSPITAL, ALA.
Sample selection and testing of separation processes [NASA-CR-176569] N86-17502

I

IIT RESEARCH INST., CHICAGO, ILL.
Creep-rupture behavior of iron superalloys in high-pressure hydrogen [NASA-CR-175027] N86-17531
ILLINOIS INST. OF TECH., CHICAGO.
Heavy particle production in high energy hadron collisions [DE85-018354] N86-18143
ILLINOIS STATE GEOLOGICAL SURVEY, CHAMPAIGN.
Sources of information on engineering geology and related topics for northeastern Illinois [PB85-241933] N86-17948
ILLINOIS UNIV., URBANA.
Experimental study of the shock wave-turbulent boundary layer interaction [DE85-016583] N86-17676
Superlattices and multilayer structures for high efficiency solar cells N86-17850
ILLINOIS UNIV., URBANA-CHAMPAIGN.
Error propagation in a digital avionic processor: A simulation-based study [NASA-CR-176501] N86-17351
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Progress in the development of a two-fluid model of turbulence for near-wall flows. Part 2: Heat-transfer characteristics of a boundary layer [CFD/84/8-PT-2] N86-17686
Two-fluid models of turbulence [NASA-CR-176419] N86-17687
The numerical calculation of particle-size distributions in 2D jets and boundary layers [CFD/85/6] N86-17688
Laminar flow in a driven square cavity [PDR/CFDU/IC/17] N86-17689
One-dimensional prediction of the interface motion separating two immiscible fluids enclosed in a long duct [PDR/CFDU/IC/19] N86-17690
INDIANA UNIV., BLOOMINGTON.
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV [DE85-018410] N86-18147
Indiana University High Energy Physics Group [DE85-012000] N86-18169
INSTITUT FRANCO-ALLEMAND DE RECHERCHES, ST. LOUIS (FRANCE).
Measurements of the two phase flow in the neighborhood of the exhaust of a 7.62 mm caliber gun [ISL-R-110/84] N86-17518
INSTITUT FUER ANGEWANDTE GEODAESIE, FRANKFURT AM MAIN (WEST GERMANY).
Contributions to geodesy, photogrammetry, and cartography, series 2 [ISSN-0469-4244] N86-17818
A system of computer programs for an astrogravimetric geoid determination N86-17819
Integration of remote sensing data and cartographic data bases into a land information system N86-17820
INSTITUT FUER FENSTERTECHNIK E.V., ROSENHEIM (WEST GERMANY).
Investigations concerning the aging behavior of heat-insulated aluminum composite profiles [BMFT-FB-T-85-066] N86-17483
INSTITUTE FOR PERCEPTION RVO-TNO, SOESTERBERG (NETHERLANDS).
Speech processing for intelligibility improvement [IZF-1985-14] N86-17610
Heat image generators: State of affairs by the exploration of some possibilities [IZF-1985-15] N86-17723
Photosimulation of target acquisition in the presence of smoke: A pilot study [IZF-1984-36] N86-17986
Heat transfer in impermeable clothing: Sweat plays a role after all [IZF-1985-9] N86-17992
A Computer Aided Design (CAD) system as a tool for the ergonomist in developing man-machine systems [IZF-1985-10] N86-17993
Color on displays. Part 1: The psychophysical and physiological aspects [IZF-1985-11] N86-17994
Application of active noise reduction for hearing protection and speech intelligibility improvement [IZF-1985-7] N86-18131
The Smoke Transmission and Reflection Threshold (START) model; the Oldebroek (Netherlands) 2 trials, May 1981 [IZF-1984-22] N86-18187
INSTITUTE OF OCEANOGRAPHIC SCIENCES, WORMLEY (ENGLAND).
A study of ERS-1 radar altimeter data processing requirements [ESA-CR(P)-2073] N86-18028
INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
Compensating structure and parameter optimization for attitude control of a flexible spacecraft [INPE-3564-PRE/770] N86-17371
CNPq/INPE-LANDSAT system [E86-10019] N86-17814
INSTITUUT VOOR CULTURTECHNIEK EN WATERHUISHOUDING, WAGENINGEN (NETHERLANDS).
Hydrological description of a study area around pump station 't Klooster (the Netherlands); application of hydrological models and remote sensing [NOTA-1542] N86-17831
Simple method for the determination of regional daily evapotranspiration of crops using remote sensing [NOTA-1580] N86-17832
Study of effects of pump station Olden Eibergen (Netherlands) on agriculture using remote sensing and hydrological models [NOTA-1544] N86-17833
INTERNATIONAL BUSINESS MACHINES CORP., POUGHKEEPSIE, N.Y.
Improving the response time of a switching regulator using SENSIT and DESIGN/ASTAP N86-17462
INTERNATIONAL TRAINING CENTRE FOR AERIAL SURVEY, ENSCHEDE (NETHERLANDS).
Activities report in remote sensing training N86-17830
IOWA UNIV., IOWA CITY.
Development of a two-scale turbulence model and its application N86-17662
ITALSPAZIO, ROME (ITALY).
Configuration study of the NAVSAT system satellites [ITS-TR-011/85] N86-17374

J

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Corrosion of metals by hydrazine N86-17395
The effects of surface pretreatment and nitrogen tetroxide purification on the corrosion rate of Type 304L stainless steel N86-17396
The O sub 2/H sub 2 propulsion module for planetary spacecraft injection energy augmentation N86-17422
Solar thermal propulsion for planetary spacecraft N86-17423
Thermal arcjet technology for space propulsion N86-17427
Microwave electric propulsion for orbit transfer applications N86-17429
Designing high frequency ac inductors using ferrite and Molypermalloy Powder Cores (MPP) N86-17452
Interplanetary exploration-A challenge for photovoltaics N86-17861
PASP: A high voltage array experiment N86-17863
Laser-assisted solar cell metallization processing [NASA-CR-176457] N86-17883
JOHNS HOPKINS UNIV., LAUREL, MD.
The 1985 JANNAF Propulsion Meeting, volume 1 [AD-A161084] N86-17380
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
USSR report: Electronics and electrical engineering [JPRS-UEE-84-016] N86-17640
Research on propagation of decimetric radiowaves at high latitudes N86-17641
One-channel adaptive antenna for troposhere microwave relay lines N86-17642
Metrological provision for measurement of relative energy density distribution over beam cross section and of beam divergence in pulse lasers N86-17643
Multichannel commutators of analog signals for measurement of energy distribution over beam cross section of pulse laser N86-17644
The 400-channel commutator for measurement of energy distribution in laser beam N86-17645
Dependence of error of measurement of relative energy or power density distribution over cross section of laser beam on space factor of multielement radiation transducer N86-17646
Photoelectric instrument for measuring relative energy density distribution in beams of pulse lasers N86-17647
Establishment and use of time unification system for civil aviation N86-17648
Measurement of velocity of object moving near large reflecting surface N86-17649

Method of measuring emittance of thermal insulation materials at low temperatures N86-17650
Magnetization reversal in triaxial single-domain particles N86-17651
Determining spatial orientation of axes of elliptical magnetic field N86-17652
Magnetic field of excitation winding in experimental cryogenic turbogenerator N86-17653
Reversible component of magnetic induction in magnetically soft materials during magnetization reversal N86-17654
Equivalent-circuit calculations for built-up magnetic structures by projection method N86-17655

K

KANSAS STATE UNIV., MANHATTAN.
Microprocessor control of wind-driven induction generators N86-18050
KANSAS UNIV., LAWRENCE.
Development of a sensitivity analysis technique for multiloop flight control systems
[NASA-CR-166619] N86-17358
KAWASAKI HEAVY INDUSTRIES, LTD., AKASHI (JAPAN).
The role of computational fluid dynamics in aeronautical engineering
[REPT-2] N86-17296
KEMA (N. V.), ARNHEM (NETHERLANDS).
The design of shielded enclosures, especially for high-voltage laboratories
[S/T-REPT-VOL-2-NO-11] N86-17360
High-voltage measurements using digital techniques
[S/T-REPT-VOL-2-NO-8] N86-17636
Measuring the electric field in the atmosphere in connection with investigations on the dispersion of air pollution
[S/T-REPT-VOL-2-NO-10] N86-17924
KENTUCKY UNIV., LEXINGTON.
Polynuclear pyrazolyl-bridged spiro species containing boron and metal centers
[AD-A159847] N86-17569
KERNFORSCHUNGSANLAGE, JUELICH (WEST GERMANY).
Spectral analysis and metallographic investigations of corrosion and precipitation products of high temperature alloys
[JUEL-1975] N86-17553
Status of the intense pulsed neutron source
[DE85-018387] N86-18170
KERNFORSCHUNGSZENTRUM, KARLSRUHE (WEST GERMANY).
Test of a measuring instrument composed of two local flow turbines, two drag bodies, a full flow turbine and a two-beam densitometer, of the Large Pressurized Water Reactor Offnormal Behavior Investigation (LOBI) instrumentation in a transient two-phase flow
[KFK-3877] N86-17694
KIRUNA GEOPHYSICAL INST. (SWEDEN).
The hot plasma spectrometers on Viking
[KGI-PREPRINT-077] N86-17377
Generation of magnetic field aligned currents, parallel electric fields, and inverted-V structures by plasma pressure inhomogeneities in the magnetosphere
[KGI-PREPRINT-073] N86-17941
Generation of magnetospheric radiation by decay of Bernstein waves
[KGI-PREPRINT-076] N86-17942
Boundary layer plasmas as a source for high-latitude, early afternoon, auroral arcs
[KGI-PREPRINT-079] N86-17943
KOLLSMAN SYSTEM-TECHNIK G.M.B.H., MUNICH (WEST GERMANY).
Development of a piezoelectric quartz pressure sensor for avionics with excellent long term stability (with final demonstration of the results on a prototype)
[BMFT-FB-W-85-010] N86-17353
KORROSIONSINSTITUTET, STOCKHOLM (SWEDEN).
The corrosion properties of aluminum bronzes: A literature review
[KIS-1985-3E] N86-17532
Plastics and rubber in different chemical environments: A survey of their resistance to corrosion
[KIS-1985-2E] N86-17568
KRAFTWERK UNION A.G., MULHEIM (WEST GERMANY).
Development of low-emission gas turbine combustion systems
[BMFT-FB-T-85-064] N86-17763
KRUPP (FRIED.) G.M.B.H., ESSEN (WEST GERMANY).
Development of cobalt-free high grade permanent magnets on the basis of MnAl alloys
[BMFT-FB-T-85-099] N86-17559
KYOTO INST. OF TECH. (JAPAN).
Numerical analysis for steady transonic flows past an airfoil using AF scheme N86-17289
Numerical solution of viscous compressible flows past an airfoil using unconditionally stable explicit method N86-17290
KYOTO UNIV. (JAPAN).
Flows of gas-particle mixtures with size-distribution N86-17274
Numerical grid generation using algebraic and geometrical techniques N86-17288

L

LAVERY (THOMAS J.), MEMPHIS, TENN.
Hybrid gas/electric vehicle
[DE85-016736] N86-18254
LAWRENCE LIVERMORE NATIONAL LAB., CALIF.
Initial results for the failure strength of a LOVA gun propellant at high pressures and various strain rates N86-17402
Learning algorithms in the infrared
[DE85-016441] N86-17507
Remote and in-situ analysis
[DE85-017397] N86-17515
Calculating the vulnerability of synthetic polymers to autoignition during nuclear flash
[DE85-016649] N86-17571
Artificial viscosity Q errors for strong shocks and more-accurate shock-following methods
[DE85-017830] N86-17672
Results of PRIM gyroscope testing: Conclusions regarding PRIM effects, supplement 1
[DE85-012933] N86-17706
Coupling between plastic scintillators and light fibers for remote detection of X-rays
[DE85-016946] N86-17707
Microwave detector
[DE85-017797] N86-17711
Viscosity, granular-temperature and stress calculations for shearing assemblies of inelastic: Frictional disks
[DE85-015173] N86-17794
An approach to the quantification of seismic margins in nuclear power plants
[TI85-017151] N86-17934
Forward and backward trajectories using GRANTOUR: A preliminary study for Arctic trajectories
[DE85-017675] N86-17956
Natural Phenomena Hazards Modeling Project. Extreme wind/tornado hazard models for Department of Energy sites. Revision 1
[DE85-018156] N86-17957
ORION: An interactive color post-processor for two dimensional finite element codes, revision 2
[DE85-017876] N86-18021
MFTF-B load-flow analysis: A mainframe application implemented on a personal computer
[DE85-018155] N86-18023
Intelligent gateway processors as integrators of CAD/CAM networks
[DE85-016287] N86-18025
Parametric study of the amplification factor in the energy balance method
[TI85-010472] N86-18111
Conceptual approach to the design of 50-tesla hyper-field superconducting magnetic coils
[DE85-017881] N86-18114
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
Difficulties with inferring neutron cross sections from charged-particle reactions
[DE86-000020] N86-18149
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152
Radioactive ion beam research at LLNL
[DE85-018183] N86-18156
Brightness measurements on the Livermore high brightness test stand
[DE86-000016] N86-18157
Optical switch
[DE85-017783] N86-18184
Surface finish measurements of diamond-turned electroless-nickel-plated mirrors
[DE85-017833] N86-18185
Bibliographic post-processing with the TIS Intelligent Gateway: Analytical and communication capabilities
[DE85-018153] N86-18245
Nuclear astrophysics away from stability
[DE85-018188] N86-18281
LEEDS UNIV. (ENGLAND).
High strain-rate properties of materials
[BR94080] N86-17785
LEHIGH UNIV., BETHLEHEM, PA.
Vortex formation from bluff and thin trailing-edges: The initial instability N86-17304
Response of viscoelastic slab to viscous slab to viscous fluid flow N86-17657
LOCKHEED MISSILES AND SPACE CO., SUNNYVALE, CALIF.
A new small signal ac analysis tool for space power systems N86-17443
LOS ALAMOS NATIONAL LAB., N. MEX.
High strain rate deformation in FCC metals and alloys
[DE85-017533] N86-17536
Experimental results on a low-temperature magnetic refrigerator
[DE85-017541] N86-17583
Position sensitive gas counter readout system
[DE85-017953] N86-17713
Design and performance of large area monolithic electron guns for the Aurora KrF laser system
[DE85-014112] N86-17734
Measurement of Faraday rotation in twisted optical fiber using rotating polarization and analog phase detection
[DE85-015704] N86-17737
Metal film deposition by laser breakdown chemical vapor deposition
[DE85-017554] N86-17738
Apparatus for laser beam profile measurements
[DE85-017789] N86-17740
Machine imparting complex rotary motion for lapping a spherical inner diameter
[DE85-017790] N86-17754
EPIC: An error propagation/inquiry code
[DE85-015693] N86-18019
Expert systems for design and simulation
[DE85-017565] N86-18053
Group representation matrix and scattering from nuclei
[DE85-017527] N86-18139
ABC's of pion charge exchange
[DE85-017531] N86-18155
Study of optical transition radiation produced by 30 to 70 MeV energy electrons: Application to the diagnostics of beams with charged particles. Chapter 2: Description of the experimental device. Chapter 6: Experiments with transition radiation interference
[DE86-001258] N86-18158
Nanosecond optical shutters
[DE85-017535] N86-18182
Review of high bandwidth fiber optics radiation sensors
[DE85-017559] N86-18183
Imaging techniques utilizing optical fibers and tomography
[DE85-017536] N86-18186
Quantum resonances in physical tunneling
[DE85-017558] N86-18214
Relaxation-time spectrum for a hydrogen relaxation peak in a Nb-50-at. %-V alloy
[DE85-017836] N86-18220
LOUISIANA STATE UNIV., BATON ROUGE.
Lorentz anomaly in arbitrary dimensions
[DE86-001332] N86-18116
Gravitational counterterms in an axial gauge
[DE86-001329] N86-18237

M

MAIN (CHARLES T.), INC., NEW YORK, N.Y.
Chemistry of carbonyl sulfide
[DE85-018430] N86-17513
MARITIEM RESEARCH INST. NEDERLAND, WAGENINGEN.
Numerical simulation of flow around circular cylinders at high Reynolds numbers
[Z-50551] N86-17697
MARQUARDT CORP., VAN NUYS, CALIF.
Bipropellant Earth storable rocket engines for satellites: A 1985 update N86-17398
MARTIN MARIETTA AEROSPACE, DENVER, COLO.
Design optimization for a space based, reusable orbit transfer vehicle N86-17418
MARTIN MARIETTA AEROSPACE, NEW ORLEANS, LA.
Shuttle derived unmanned launch vehicle N86-17403
MARYLAND UNIV., COLLEGE PARK.
A study of continuous wave lasing and modelocking in a neodymium-phosphate glass crystal N86-17729
Characterizing software with objective measurements
[AD-A160018] N86-18014
Maryland controlled fusion research program. Volume 1
[DE85-018027] N86-18197

MASCHINENFABRIK AUGSBURG-NUERNBERG A.G., MUNICH (WEST GERMANY).
Test and operation program STEP 100 (German-Australian solar power plant in Meekatharra, Western Australia)
[BMFT-FB-T-85-077] N86-17887
MASSACHUSETTS INST. OF TECH., BROOKHAVEN STATION, N.Y.
Localized electrochemical corrosion of nickel based alloys
[DE86-000521] N86-17545
MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Raman spectroscopic study of molten salt electrolysis of light metals
[DE85-017480] N86-17509
Realization and approximation of stationary stochastic processes
[AD-A158996] N86-18100
Brownian motion
[AD-A160020] N86-18103
Axisymmetric tandem mirror stabilized by a magnetic limiter
[DE85-017349] N86-18192
MASSACHUSETTS UNIV., AMHERST.
Structure-property studies in the deformation of semi-crystalline polymers N86-17565
MATERIALS CONSULTANT ASSOCIATES, INC., PICKENS, S.C.
Chemically bonded ceramic materials for use in thermal energy storage devices
[DE85-018078] N86-17572
MATRA ESPACE, TOULOUSE (FRANCE).
Bio-Observation Subsystem (BOSS) feasibility study
[BOSS-010-MT] N86-17362
The Telecom 1 power subsystem from design to flight N86-17434
An alternative for satellite power distribution N86-17450
A computer analysis tool for evaluation of solar array design N86-17468
MATPWR: A mission analysis tool for LEO spacecraft power profiles computation N86-17469
Validation of a software package for communication systems analysis and design: The TOPSIM 3 software
[ESA-CR(P)-2075] N86-18029
MAX-PLANCK-INST. FUER ASTRONOMIE, HEIDELBERG (WEST GERMANY).
Optical study of Sharpless 252 (NGC 2175) N86-18268
MAX-PLANCK-INST. FUER PHYSIK UND ASTROPHYSIK, GARCHING (WEST GERMANY).
Preparation of the helium-cooled German Infrared Laboratory (GIRL) interferometer for scientific use on Spacelab
[MPE-192] N86-17721
MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
Ultraviolet laser-induced photocondensation in the benzol vapor phase
[MPIS-4/1985] N86-17520
Sound excitation during vortex-airfoil interaction
[MPIS-MITT-80] N86-18130
Investigation of the dynamics of selectively rotation-vibrationally excited difluoromethylene
[MPIS-5/1985] N86-18160
Investigation of the formation, ionization, and collision dynamics of microclusters using scattering analysis
[MPIS-6/1985] N86-18161
Investigations of the interaction between Na(3P) and K(4S) using measurements of the differential scattering cross section
[MPIS-7/1985] N86-18162
MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Rocket motor slag formation. Effects of internal flow field and propellant grain configuration N86-17414
MECHANICAL TECHNOLOGY, INC., LATHAM, N. Y.
Breadboard development of a hydraulically coupled free piston engine heat pump compressor
[DE85-005242] N86-17874
MEDICAL BIOLOGICAL LAB. RVO-TNO, THE HAGUE (NETHERLANDS).
Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
[MBL-1985-6] N86-17980
MEDICAL COLL. OF OHIO, TOLEDO.
Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
[AD-A156772] N86-17981
MEMPHIS STATE UNIV., TENN.
Power series approximations to the null distributions of some Chi-Bar-Square statistics
[AD-A159785] N86-18101
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., MUNICH (WEST GERMANY).
Development of thin-film solar cells based on amorphous silicon
[BMFT-FB-T-85-096] N36-17893
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
Metallizing of fiber reinforced composites
[MBB-Z-46/48] N86-17482
Development of scanner digital image acquisition for photogrammetry
[MBB-UA-876/85] N86-17827
METAALCOMPAGNIE BRABANT B.V., EINDHOVEN (NETHERLANDS).
Noise prevention N86-18132
METALLGESELLSCHAFT, A.G., FRANKFURT AM MAIN (WEST GERMANY).
Pressing effect and stress corrosion cracking of an extruded AlZnMgCu type aluminum alloy
[BMFT-FB-T-85-087] N86-17558
METALS SOCIETY, LONDON (ENGLAND).
Influence of catalytic additions on ferric-oxide reduction
[BLL-BIS!-23009-(9022.060)] N86-17526
The boriding of refractory metals
[BLL-BISI-23037-(9022.060)] N86-17527
METRAFLU, ECULLY (FRANCE).
Analysis of the noise emitted by a tail rotor N86-18129
METROPOLITAN COLL. OF TECHNOLOGY, TOKYO (JAPAN).
Transonic internal flow about an airfoil oscillating in pitch: Comparisons between computation and experiment N86-17278
MICHIGAN STATE UNIV., EAST LANSING.
Fractal behavior of isosets and trails in superionic conductors
[DE85-018409] N86-18226
MICHIGAN UNIV., ANN ARBOR.
Variability in patterns of acid deposition resulting from climatological variability
[DE85-018392] N86-17913
White light optical information processing
[AD-A160311] N86-18180
MIDWEST RESEARCH INST., GOLDEN, COLC.
Economic contribution of lignins to ethanol production from biomass
[DE85-008814] N86-17578
Semiconductor electrode with improved photostability characteristics
[DE85-017805] N86-17625
Thermal stratification in direct gain passive heating systems with variable heating of the floor and one vertical wall
[DE85-016860] N86-17677
Overview of SERI's high efficiency solar cell research N86-17841
Control of superlattice morphology in GaAs sub1-subxPsubx cascade cells N86-17849
Solar Thermal Research Program Annual Conference
[DE85-002938] N86-17875
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876
Analysis of simultaneous heat and mass transfer in soils below solar ponds
[DE85-012163] N86-17877
Reactor design for uniform chemical vapor deposition-grown films without substrate rotation
[DE85-017804] N86-18219
MINNESOTA UNIV., MINNEAPOLIS.
HLA-D: The T cell perspective
[AD-A160019] N86-17976
Clonal analysis of HLA-DR and -dQ associated determinants: Their contribution to dw specificities
[AD-A160059] N86-17977
Recent progress on boundary value problems on Lipschitz domains
[MATH-REPT-84-133] N86-18064
MISSISSIPPI STATE UNIV., STATE COLLEGE.
Interface procedures for overlapping grids
[NASA-CR-176460] N86-18061
MISSOURI UNIV., ROLLA.
Power series approximations to the null distributions of some Chi-Bar-Square statistics
[AD-A159785] N86-18101
MITSUBISHI ELECTRIC CORP., KAMAKURA (JAPAN).
Development of subsonic computational aerodynamic program using panel method N86-17286
MITSUBISHI HEAVY-INDUSTRIES LTD., TOKYO (JAPAN).
The comparison of the transonic airfoil calculation by NSFOIL with the wind tunnel test data at high Reynolds number N86-17295
A wing design based on the three-dimensional transonic inverse method and the comparison with the wind tunnel testing data N86-17299
MONTANA UNIV., MISSOULA.
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
MORTON THIOKOL, BRIGHAM CITY, UTAH.
Low cost carbon/carbon nozzles for solid rocket motors N86-17381
Elastomeric Barrier Pulse Motors N86-17385
Factors affecting Pi sub k in HTPB formulations N86-17390
Use of peel values in structural analysis N86-17394
MURRAY STATE UNIV., KY.
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] N86-17815

N

NAGOYA UNIV. (JAPAN).
Numerical analysis of transonic flow around two-dimensional airfoil by solving Navier-Stokes equations N86-17292
NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
Resonance production in gamma gamma collisions 2
[NIKHEF-H/85-2] N86-17890
Large-t elastic scattering and diffraction dissociation
[NIKHEF-H/85-4] N86-18163
NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
Space Station Engineering and Technology Development. Proceedings of the Panel on Program Performance and Onboard Mission Control
[NASA-CR-176484] N86-17372
Methods for Designing Software to Fit Human Needs and Capabilities. Proceedings of the Workshop on Software Human Factors
[AD-A156647] N86-18242
NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO).
High temperature oxidation and hot corrosion of nickel and cobalt based superalloys
[NAE-AN-33] N86-17530
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aerodynamic design trends for commercial aircraft
[NASA-TM-77976] N86-17338
X-ray satellite
[NASA-TM-77997] N86-17370
Satellite remote sensing for ice sheet research
[E86-10024] N86-17817
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Development of computational fluid dynamics at NASA Ames Research Center N86-17275
Observations of the J = 10 manifold of the pure rotational band of phosphine on Saturn
[NASA-TM-86851] N86-18277
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHNSON (LYNDON B.) SPACE CENTER,
Computer simulation of environmental, hazard scenarios in space N86-17411
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
A control system design approach for flexible spacecraft
[NASA-TM-87599] N86-17373
Partitioning problems in parallel, pipelined and distributed computing
[NASA-CR-178023] N86-17997
The algorithms for rational spline interpolation of surfaces
[NASA-TP-2536] N86-18060
Separation of airborne and structureborne noise radiated by plates constructed of conventional and composite materials with applications for prediction of interior noise paths in propeller driven aircraft
[NASA-TM-87414] N86-18121
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
MMIC antenna technology development in the 30/20 gigahertz band
[NASA-TM-87192] N86-17368
Small, two-stage, partial-admission turbine N86-17386

LOX/LH2 vane pump for auxiliary propulsion systems N86-17397
Cyclic structural analyses of anisotropic turbine blades for reusable space propulsion systems N86-17404
Advanced research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion N86-17405
Advanced seals for Liquid Oxygen (LOX) turbopumps N86-17408
Radiation exposure and performance of multiple burn LEO-GEO orbit transfer trajectories N86-17417
Vacuum chamber pressure effects on thrust measurements N86-17425
Compatibility experiments of facilities, materials, and propellants for electrothermal thrusters N86-17426
Design of high-voltage, high-power, solid state remote power controllers for aerospace applications N86-17456
Effect of argon and hydrogen on deposition of silicon from tetrochlrosilane in cold plasmas
[NASA-TM-87219] N86-17472
Specimen geometry effects on graphite/PMR-15 composites during thermo-oxidative aging
[NASA-TM-87204] N86-17477
Technology achievements and projections for communication satellites of the future
[NASA-TM-87201] N86-17595
Nonlinear bending-torsional vibration and stability of rotating, pretwisted, preconed blades including Coriolis effects
[NASA-TM-87207] N86-17789
Space Photovoltaic Research and Technology 1985: High Efficiency, Space Environment, and Array Technology
[NASA-CP-2408] N86-17839
Gallium arsenide solar cell efficiency: Problems and potential N86-17843
A possible radiation-resistant solar cell geometry using superlattices N86-17851
Radiation damage in high-resistivity silicon solar cells N86-17856
Performance of Hughes GaAs concentrator cells under 1-MeV electron irradiation N86-17860
Demonstrated results of welded and soldered interconnections N86-17866
Space station power management and distribution N86-17869

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
Oxygen/hydrocarbon combustion devices technology N86-17407
Close-in characteristics of LH2/LOX reactions N86-17410
Space station advanced propulsion and fluid management program N86-17420

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. WHITE SANDS TEST FACILITY, N. MEX.
An experimental data base for material selection and design of high-speed, high-pressure, oxygen turbomachinery N86-17387
Explosive decomposition of hydrazine due to rapid gas compression N86-17430

NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
Inverse method with geometry constraints for transonic airfoil design
[NLR-MP-84069-U] N86-17311
Comment on the yaw stability of a horizontal-axis wind turbine at small angles of yaw
[NPL-MP-84084-U] N86-17312
Application of a constrained inverse method in the aerodynamic design of a low speed wing-slat configuration
[NLR-TR-83123-U] N86-17320
A system for computer aided analysis and design of multielement airfoils: MAD
[NLR-TR-83136-U] N86-17321
A theoretical exploration of the capabilities of 2D flexible wall test sections for 3D testing
[NLR-MP-84018-U] N86-17322
A survey of computational methods for subsonic and transonic aerodynamic design
[NLR-MP-84066-U] N86-17323
Hardware/software Failure Mode Effect Analysis (FMEA) applied to airplane safety
[NLR-MP-84073-U] N86-17325
A sophisticated tracking algorithm for Air Traffic Control (ATC) surveillance radar data
[NLR-MP-84004-U] N86-17334
Comparison of a jump-diffusion tracker with a Kalman tracker: An evaluation with emphasis on air traffic control
[NLR-TR-83063-U] N86-17335
Damage-tolerant aircraft design
[NLR-MP-84005-U] N86-17342
Helicopter-ship qualification testing
[NLR-MP-84062-U] N86-17343
Operational application of the STALINS method for measuring take-off and landing trajectories
[NLR-TR-83010-U] N86-17346
Three-dimensional flight-path reconstruction by means of spline approximation
[NLR-TR-83091-U] N86-17347
Estimation of load exceedances of an aircraft under carriage with nonlinear properties excited by random runway unevenness
[NLR-TR-84030-U] N86-17348
Optimization in design processes: An informatics point of view
[NLR-MP-84074-U] N86-17349
The application of sensors in light tests
[NLR-MP-84056-U] N86-17352
Reliability aspects of software for digital avionics
[NLR-TR-82126-U] N86-17354
Towards digital computer simulation of the dynamics of flexible spacecraft
[NLR-TR-83106-U] N86-17376
Functional built-in-test in a pipeline image processor
[NLR-MP-84020-U] N86-17379
Activities report in aerospace research, with data concerning the scientific committee NLR-NIVR, international cooperation concerning AGARD, DNW, GARTEUR and cooperation with Indonesia N86-17588
Limitations in variable conductance heat pipe performance and control predicted by the current steady-state model developed at NLR
[NLR-MP-84009-U] N86-17695
A survey of numerical methods for the calculation of inviscid, possibly rotational Euler flows around aeronautical configurations
[NLR-TR-83130-U] N86-17699
Boundary layer calculations on the leeward surface of a slender delta wing at incidence
[NLR-TR-84001-U] N86-17700
Quadrinomial distribution for the characterization of nondestructive inspection (NDI) reliability
[NLR-MP-84064-U] N86-17774
Reliability of nondestructive inspection
[NLR-TR-84011-U] N86-17775
Residual strength of bonded stiffened panels: Prediction and experimental verification
[NLR-TR-83066-U] N86-17808
Fatigue rated fastener systems in aluminum alloy structural joints
[NLR-MP-83045-U] N86-17809
Noise assessment around Schiphol airport (the Netherlands) in 1981
[NLR-TR-82034-U] N86-17915
Noise assessment around Rotterdam airport (the Netherlands) in 1981
[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
Noise assessment around Eelde Airport (the Netherlands): Leading contours
[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922
On-line superposition of geographical data to TIROS-N type meteorological satellite images
[NLR-TR-82133-U] N86-17962
Computer Aided Design (CAD) at the National Aerospace Laboratory (Netherlands) with the accent on aircraft flight control systems
[NLR-MP-84032-U] N86-18030
The use of vector computers in aerodynamic computations
[NLR-MP-84051-U] N86-18031
Postprocessing NLR High Speed Tunnel (HST) wind tunnel data by data by means of Engineering Data Interactive Presentation and Analysis System (EDIPAS)
[NLR-MP-84083-U] N86-18032
Channel coding with the (255, 255-2T) Reed-Solomon codes over CF (256)
[NLR-TR-83149-U] N86-18042
An efficient filter for abruptly changing systems
[NLR-MP-84071-U] N86-18056
An axiomatic theory of heterogeneity and homogeneity
[NLR-MP-84054-U] N86-18084
Bifurcation and stability, a numerical approach
[NLR-MP-84078-U] N86-18085
Channel design for closed cycle MHD
[NLR-MP-84053-U] N86-18205
Personnel activities report in aerospace research N86-18243
Engineering Data Interactive Presentation and Analysis System (EDIPAS): A general approach to engineering data management and analysis applied to wind tunnel testing
[NLR-MP-83057-U] N86-18252
A review of space-related thermophysical research at NLR
[NLR-MP-84063-U] N86-18256

NATIONAL AEROSPACE LAB., TOKYO (JAPAN).
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
[NAL-SP-3] N86-17267
Rarefied gas numerical wind tunnel: Monte Carlo simulation N86-17270
Numerical simulation of the leading-edge separation vortex over delta wing N86-17271
Numerical simulation of unsteady flow around an airfoil by finite difference solution of Navier-Stokes equations N86-17273
Numerical analysis of fully three-dimensional flow in transonic turbine cascades N86-17279
Fully-three dimensional flow field analysis through turbine states: Applications of time marching method N86-17280
Numerical flow analysis for axial flow turbine N86-17281
An experimental study of pressure distributions on the endwalls in a transonic annular nozzle cascade N86-17282
A basic computer code for industrial burner designs. Part 1: Capability test in isothermal swirling flows N86-17284
Investigations on efficient numerical method for subsonic lifting surfaces N86-17285
Image processor architectures and a data-driven image processore: TIP-1 N86-17287
Analysis of high Reynolds number transonic flow around an airfoil N86-17293
Validation and comparison with experiment of a high Reynolds number transonic flow airfoil analysis code NSFOIL N86-17294
A numerical solution of the transonc integral equation and its application to three-dimensional transonic wing design N86-17298
Estimation of divergence and flutter boundaries on supersonic plate wing models from subcritical random responses due to air turbulence
[NAL-TR-856] N86-17308

NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769

NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501
NDE (Non-Destructive Evaluation) publications, 1982
[PB85-244069] N86-17776
Technical overview of the information resource dictionary system
[PB85-224491] N86-18004

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Uncorrelated noise in turbulence measurements
[PB85-212314] N86-17968

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D. C.
Monthly infrared imagery enhancement curves: A tool for nighttime sea fog identification off the New England Coast
[PB85-237725] N86-17966

NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.
National Geophysical Data Center
[PB85-248458] N86-17947

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Query language for the Profiler data system
[PB85-240190] N86-17965
Tsunamis in Peru-Chile
[PB85-247815] N86-17973

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
Visualisations of speech based on a model of the peripheral auditory system
[NPL-DITC-62/85] N86-17593
Temperature fixed points. 1: Possible devices in the range 0 to 125 C
[NPL-QU-70] N86-17701

A new approach to the design and construction of protocol testers
[NPL-DITC-54/85] N86-18006
The scenario test driver for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-55/85] N86-18044
Implementation assessment of the OSI network service. The test responder specification
[NPL-DITC-56/85] N86-18045
Overview of a test suite for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-59/85] N86-18046
Notes on logic
[NPL-DITC-65/1985] N86-18051
An intercomparison of measurements of the beta spectra of 90Sr-90Y
[NPL-RS(EXT)77] N86-18134
Neutron dosimetry intercomparison at the National Physics Laboratory
[NPL-RS(EXT)-79] N86-18135
An automated charge monitoring system for the NPL linear accelerator
[NPL-RS(EXT)80] N86-18136

NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs
[PB85-248110] N86-17967

NAVAL AIR SYSTEMS COMMAND, WASHINGTON, D. C.
Inverse Faraday effect in hemoglobin detected by Raman spectroscopy: An example of magnetic resonance Raman activity
[AD-A159806] N86-17975

NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.
Bibliography of research on ocean fronts, 1964-1984
[AD-A160040] N86-17970

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
GRAPS: Graphical Plotting System
[AD-A159808] N86-17821
NOSC UNIBUS (Trademark) UNIVAC Input/Output controller
[AD-A159802] N86-17999

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
The use of filters in digital coherent receivers operating in a jamming and noise environment
[AD-A159792] N86-17596
Composite operational amplifiers and their use in improving bandwidth, speed and accuracy in active networks
[AD-A159819] N86-17619
A CSMP commutation model for design study of a brushless dc motor power conditioner for a cruise missile fin control actuator
[AD-A159855] N86-17621
Assessment of the performance of an in-field Gaussian plume/puff model for overwater use
[AD-A160032] N86-17955
Estimation of sea-surface windspeed from whitecap cover: Statistical approaches compared empirically and by simulation
[AD-A159816] N86-17969
A graph theoretic algorithm for contour surface display generation
[AD-A159822] N86-18000
Reusable software: Trade-off analysis and a new approach
[AD-A159813] N86-18009
A systolic array implementation of a Reed-Solomon encoder and decoder
[AD-A159824] N86-18011
Probabilistic analysis of fault trees using pivotal decomposition
[AD-A159856] N86-18012
Random parameter Markov population process models and their likelihood, bayes and empirical bayes analysis
[AD-A159812] N86-18102

NAVAL SUBMARINE MEDICAL RESEARCH LAB., GROTON, CONN.
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704

NAVAL WEAPONS CENTER, CHINA LAKE, CALIF.
Determining behavior of solid rocket motor internal components using dynamic real-time radiography
N86-17382
Large-scale, coherent structures as drivers of ramjet combustion instabilities N86-17400

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER, SAN DIEGO, CALIF.
Computer-managed instruction: Crystallized and fluid intelligence
[AD-A160017] N86-18013

NEW MEXICO STATE UNIV., LAS CRUCES.
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148

NEW MEXICO UNIV., ALBUQUERQUE.
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211

NEWCASTLE-UPON-TYNE UNIV. (ENGLAND).
Stress corrosion cracking of 316 stainless steel in high temperature water
[BR94397] N86-17529

NIHON UNIV., TOKYO (JAPAN).
Numerical analysis about flow over an aerofoil with a large angle of attack N86-17291
The analysis of practical transonic swept wings with and without boundary layer effects N86-17300

NORTH CAROLINA STATE UNIV., RALEIGH.
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
Effects of high energy radiation on the mechanical properties of epoxy-graphite fiber reinforced composites
[NASA-CR-176487] N86-17476
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

NORTH CAROLINA UNIV., CHAPEL HILL.
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211

NORTHWESTERN UNIV., EVANSTON, ILL.
Structural phase transition in CeCu6
[DE85-018362] N86-18223

NUCLEAR ENERGY CENTRE, MOL (BELGIUM).
Sensitivity, applicability and validation of bi-Gaussian off- and on-line models for the evaluation of the consequences of accidental releases in nuclear facilities
[EUR-9385-EN] N86-17897

O

OAK RIDGE NATIONAL LAB., TENN.
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds
[DE85-017094] N86-17505
Coupled electron-nuclear magnetism and neutron diffraction
[DE85-016479] N86-17539
Survey of physical property data for several alloys
[DE85-018138] N86-17542
Recent developments concerning segregation and fracture at grain boundaries
[DE85-018106] N86-17547
Plutonium(4) hydrous polymer chemistry
[DE85-016594] N86-17570
Corrosion of materials in absorption heating and refrigeration fluids
[DE85-018140] N86-17585
High-field ZnO varistors: microstructures and properties
[DE85-018136] N86-17626
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
[DE85-016357] N86-17669
Vapor compression heat pump system field tests at the TECH complex
[DE85-016364] N86-17670
Recirculating cross-correlation detector
[DE85-017782] N86-17709
Development of a continuous-flow fluidic pump
[DE85-018152] N86-17755
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate
[TI85-016420] N86-17795
Numerical study of the performance of latent heat storage for solar dynamic power systems
[DE85-018101] N86-17884
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906
Effects of acid rain on forest nutrient status
[DE85-018120] N86-17911
Advanced servomanipulator development
[DE85-017720] N86-17989
Human-machine interfaces for teleoperators: An overview of research and development at the Oak Ridge National Laboratory. Consolidated Fuel Reprocessing Program
[DE85-017713] N86-17990

Parallel Cholesky factorization on a hypercube multiprocessor
[DE85-018121] N86-18002
ALKACYCL: A basic computer program for the analysis of alkali metal Rankine power cycles
[DE85-018125] N86-18022
ANOVA model fitting via sparse matrix computations
[DE85-017070] N86-18069
Software for rootfinding and interpolation with Runge-Kutta-Sarafyan methods
[DE85-018113] N86-18070
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137
Evolution of nuclear shapes at high spins
[DE85-018074] N86-18142
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018082] N86-18189
Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device
[DE85-018139] N86-18190
NE-213-scintillator-based neutron detection system for diagnostic measurements of energy spectra for neutrons having energies greater than or equal to 0.8 MeV created during plasma operations at the Princeton Tokamak Fusion Test Reactor
[DE85-018079] N86-18198
Thermodynamic properties and microscopic structure of fluids and fluid mixtures
[DE85-016482] N86-18234
Information Systems development aids
[DE85-018161] N86-18246

OAK RIDGE Y-12 PLANT, TENN.
In-process acoustic emission monitoring of laser welds
[DE85-017184] N86-17772

OCLI, SANTA ROSA, CALIF.
Thin film coatings for improved alpha/epi N86-17867

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Subsonic unsteady aeroelasticity: The potential method applied to lifting surfaces
[ONERA-RT-21/3064-RY-045-R] N86-17315
Critical analysis of turbulence restitution from acceleration measurements
[ONERA-RT-3/3567-RY-C40-R] N86-17340
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
Relationship between components and performance of composite materials. Part 1: BSL914 matrix systems
[ONERA-RT-1/3636-M-PT-1] N86-17488
Feasibility study of a device to control aircraft electromagnetic protection
[ONERA-RS-10/3466-PY] N86-17637
Study of surface discharges
[ONERA-RF-10/7236-PY] N86-17639
Unsteady three-dimensional surface theory with the free surface effect: Supercritical case
[ONERA-P-1984-1] N86-17683
The steady lifting surface theory with a free-surface
[ONERA-P-1984-2] N86-17684
Models and prediction of turbulent flow with particles
[ONERA-RTS-21/7135-EY] N86-17692
Computation of viscous compressible flow in a turbomachine blade array
[ONERA-RSF-27/7077-AY-408] N86-17693
Characterization of the electromagnetic radiation preceding lightning
[ONERA-NT-1985-1] N86-17960
Scattering of an acoustic field by a nonhomogeneous nonuniform flow
[ONERA-P-1985-1] N86-18127
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128
Publications, catalog 1985 N86-18249
Films, catalog 1985 N86-18250

OFFICINE GALILEO S.P.A., FLORENCE (ITALY).
Bio-observation subsystem, phase A study, executive summary
[REPT-648-DT-6-ISSUE-1] N86-17364

OHIO STATE UNIV., COLUMBUS.
Crack growth in an elastic-primary creeping material
N86-17779
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152

OKLAHOMA STATE UNIV., STILLWATER.
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598

OLD DOMINION UNIV., NORFOLK, VA.
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena
[NASA-CR-176485] N86-17475

OREGON STATE UNIV., CORVALLIS.
Wind turbulence input model for horizontal axis wind turbines N86-17303
OREGON UNIV., EUGENE.
Lithium soft X-ray laser N86-17730
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143
OSAKA UNIV., TOYONAKA (JAPAN).
Coupled electron-nuclear magnetism and neutron diffraction
[DE85-016479] N86-17539
First order phase transformations: Scaling relations for grain self-correlation functions
[DE85-017509] N86-18213
OXFORD UNIV. (ENGLAND).
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites
[OUEL-1578/85] N86-17480
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites
[OUEL-1579/85] N86-17481
The effect of quenching rate on the temperature and strain-rate sensitivity of uranium 2w/o molybdenum alloy
[OUEL-1577/85] N86-17528
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801
Generalized predictive control. Part 2: Extensions and interpretations
[OUEL-1557/84-PT-2] N86-18054
Self-tuning control: Algorithms and applications
[OUEL-1567/85] N86-18055
Uncertainty estimation from system identification
[OUEL-1570/85] N86-18075

P

PACIFIC NORTHWEST LAB., RICHLAND, WASH.
Heavy metal alloys containing 30% to 90% tungsten
[DE85-017896] N86-17546
Irradiation effects on substructure related to irradiation softening
[DE85-018224] N86-17548
Identification of tribological research and development needs for lubrication of advanced heat engines
[DE85-018154] N86-17756
Atmospheric dispersion models and their limitations
[TI85-018522] N86-17905
Acid Deposition System (ADS) data base, data summary procedures and statistical reporting of spatial patterns and trends
[DE85-017910] N86-17907
Influence of a large sulfur dioxide point source on mesoscale rainwater chemistry
[DE85-018215] N86-17908
Acid rain: A primer on what, where, and how much
[DE85-017864] N86-17910
Advanced techniques for lithologic and fracture analysis utilizing thematic mapper and topographic data
[DE85-018220] N86-17935
Hanford 1984 atmospheric boundary layer experiment: Micrometeorological and tracer data archive. Set 002 documentation report
[PB85-243145] N86-17963
New delayed neutron precursors measured at TRISTAN
[DE85-017918] N86-18141
Heavy ion induced damage and disorder in intermetallic compounds with the B2 structure
[DE85-006881] N86-18212
PADUCAH GASEOUS DIFFUSION PLANT, KY.
Separation of a gas from a gas mixture
[DE85-018296] N86-17512
PARIS XI UNIV., ORSAY (FRANCE).
Quark dynamics of N anti N annihilation
[DE85-017508] N86-18153
PENNSYLVANIA DEPT. OF ENVIRONMENTAL RESOURCES, HARRISBURG.
Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
[PB85-239606] N86-17837
PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
A theoretical and experimental study of noncondensible turbulent bubbly jets N86-17661
Effects of strong diffraction on the focusing and scattering of acoustic waves N86-18120
Compositional variation in the near surface layers: An atom probe study of surface segregation in alloys N86-18207
PENNSYLVANIA TRANSPORTATION INST., UNIVERSITY PARK.
Beam steerable microwave antenna for automotive radar application N86-17591
PENNSYLVANIA UNIV., PHILADELPHIA.
Analysis of the solar powered/fuel assisted Rankine cycle cooling system. Phase 1: Revision
[DE85-016173] N86-17675
PHYSICAL DYNAMICS, INC., BELLVUE, WASH.
Experimental generation of stratified shear flows
[AD-A160304] N86-17668
PHYSIKALISCH-TECHNISCHE BUNDESANSTALT, BRUNSWICK (WEST GERMANY).
Ignition behavior of small hot components in flammable atmospheres
[PTB-W-25] N86-17519
The Physikalisch-Technische Bundesanstalt (PTB) test regulations. Immunity from disturbance. Methods to test the influence of electromagnetic disturbances on measuring equipment
[ISSN-0341-7964] N86-17592
PITTSBURGH UNIV., PA.
Differential metrics in probability spaces based on entropy and divergence measures
[AD-A160301] N86-18066
Exponential bound for error probability in NN-Discrimination
[AD-A160305] N86-18067
POLITECNICO DI MILANO (ITALY).
Exact continuous models of Pulse Width Modulation (PWM) regulators in both continuous and discontinuous conduction modes N86-17459
POLITECNICO DI TORINO (ITALY).
Results for analytical transonic flow patterns with weak shock waves over curved walls with a corner
[STN-9] N86-17319
POLYTECHNIC INST. OF NEW YORK, BROOKLYN.
The scattering of Gaussian beams incident on a transmitting layer configuration N86-17589
PONTIFICA UNIV. CATOLICA DO RIO DE JANEIRO (BRAZIL).
Comparison of different algebraic stress models in predicting temperature fluctuations and mean velocity in liquid-metals
[DE85-018374] N86-17544
PURDUE UNIV., WEST LAFAYETTE, IND.
Surface-enhanced raman spectroscopy as a probe of adsorbate-surface bonding: Simple alkenes and alkynes adsorbed at gold electrodes
[AD-A160033] N86-17503
The role of solvent reorganization dynamics in electron-transfer processes. Theory-experiment comparisons for electrochemical and homogeneous electron exchange involving metallocene redox couples
[AD-A160034] N86-17504
A device for computer-controlled potential modulation in electrochemical Fourier transform infrared spectroscopy
[AD-A159826] N86-17620
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147

Q

QUAIL GROUP, OREM, UTAH.
Benchmarking: Graphics workstations
[DE85-018182] N86-18049

R

RACAL-DECCA LTD., CHESSINGTON (ENGLAND).
Study of user segment of Navsat
[ESA-CR(P)-2089] N86-17332
RADIATION MONITORING DEVICES, INC., WATERTOWN, MASS.
Low cost, sprayed CuInSe2 solar cell research
[DE85-016953] N86-17879
RAND CORP., SANTA MONICA, CALIF.
The RAND-ABEL programming language: History, rationale, and design
[AD-A159821] N86-18010
RESEARCH INST. OF NATIONAL DEFENCE, LINKOEPING (SWEDEN).
Frequency hopping radio for high frequencies: An experimental system
[FOA-C-30390-E2] N86-17604
Electromagnetic pulse (EMP): Exposure of missile 56 in EMP simulator sapiens
[FOA-C-30398-A3] N86-17605
SAPIENS memo 9: The dependance of the electric field on the inductance of the termination
[FOA-C-30399-A3] N86-17606
Area coverage of radio networks: Method description and propagation measurements in urban area
[FOA-C-30397-E2] N86-17612
A pulsed 8 W FET power amplifier at 9.4 Ghz
[FOA-C-30402-E] N86-17613
Microelectronic image sensors: A report from the Charge Transfer Device (CTD) team at FOA 3
[FOA-C-30391-E1,E3] N86-17631
A single-balanced mixer for the Ka band
[FOA-C-30407-E] N86-17638
Electro-optical aerial reconnaissance camera: An experimental system used in a simulated reconnaissance environment
[FOA-C-30394-E1] N86-17719
RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM (SWEDEN).
A reference survey of pyrolysis of explosives
[FOA-C-20580-D1] N86-17581
A pendulum impactor for measuring the resistance of materials to jerk strains
[FOA-C-20577-D4] N86-17725
The GRAL graphic system for situational maps
[FOA-C-50007-H2] N86-17824
The VIDEDP manual
[FOA-C-10212-M4] N86-18041
RESEARCH INST. OF NATIONAL DEFENCE, UMEA (SWEDEN).
Microbial problem with storage of jet fuel in rock caverns: Development of a process for purification of corrosive jet fuel
[FOA-A-40051-B4] N86-17579
A method for estimating atmospheric stability using sodar measurements
[FOA-E-40020] N86-17944
Psychological problems associated with the wearing of respiratory protective devices: A review
[FOA-C-40216-C2] N86-17995
RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N.C.
Cell Research and Technology Workshop N86-17870
RIJKSWATERSTAAT, THE HAGUE (NETHERLANDS).
The utilization of false color aerial photography for macrophyte biomass estimation in the Oosterschelde (the Netherlands)
[MDLK-R-8509] N86-17722
Geometric correction of remote sensing images by means of ground control points
[MDLK-R-8429] N86-17828
Analysis of the radiometric relation between false color aerial photographs and multispectral scanning (MSS) images
[MDLK-R-8337] N86-17829
RISO NATIONAL LAB., ROSKILDE (DENMARK).
Atmospheric boundary layer modeling N86-17896
ROCHESTER UNIV., N. Y.
Diffusional creep of multicomponent systems
[DE86-000184] N86-17549
Thermal transport, mass-ablation and preheat in laser-target experiments
[DE85-017584] N86-17742
Anamorphic gradient index lens systems N86-18177
The interaction between electric dipoles and waveguiding surfaces at optical frequencies N86-18178
ROCKET RESEARCH CORP., REDMOND, WASH.
Analysis of electric propulsion concepts for near-term mission application N86-17424
ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF.
Nonintrusive shaft speed sensor N86-17406
Space station propulsion approaches and technology status N86-17421
Solar thermal rocket design and fabrication N86-17428
ROCKWELL INTERNATIONAL CORP., CEDAR RAPIDS, IOWA.
An analytical investigation of current-injected control for constant-frequency switching regulators N86-17458
ROME UNIV. (ITALY).
Integrability of two interacting N-dimensional rigid bodies
[PREPRINT-450] N86-18079
Chiral symmetry on the lattice with Wilson fermions
[PREPRINT-452] N86-18080
Lie-isotopic algebraic approach to formal nonpotential scattering theory
[PREPRINT-456] N86-18081
A new proposal for the determination of the renormalization group trajectories by Monte Carlo renormalization group method
[PREPRINT-453] N86-18109
Nonlinear evolution equations associated with the chiral field spectral problem
[PREPRINT-455] N86-18112
Neutrinoless double beta decay and multiquark states in nuclei
[PREPRINT-449] N86-18159
Ultraviolet problem and analytical properties of classical field theories
[PREPRINT-451] N86-18239

Towards a nonpotential scattering theory
[PREPRINT-454] N86-18240
On the stochastic quantization of field theory
[PREPRINT-457] N86-18241
Preliminary results of the study of ultraviolet background with IUE
[PREPRINT-447] N86-18279

ROYAL AIR FORCE INST. OF PATHOLOGY AND TROPICAL MEDICINE, AYLESBURY (ENGLAND).
A waterproof vent valve for immersion suits
[REPT-515] N86-17988

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
Recent experience in the RAE 5 meter wind tunnel of a china clay method for indicating boundary layer transition
[RAE-TM-AERO-2007] N86-17306
Studies of the flow field near a NACA 4412 aerofoil at nearly maximum lift
[RAE-TM-AERO-2026] N86-17307
A rapid method for estimating equivalent parabolic polars from wind-tunnel tests
[RAE-TM-AERO-2034] N86-17309
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 1: Background and fatigue evaluation
[RAE-TR-84084] N86-17336
Standardised fatigue loading sequences for helicopter rotors (Helix and Felix). Part 2: Final definition of Helix and Felix
[RAE-TR-84085] N86-17337
Reduction of aliphatic nitrocompounds on nonoxidised and oxidised carbon fibre electrodes
[BR97661] N86-17471
A review of the physical ageing of epoxy resins and their carbon fibre composites
[RAE-TM-1051(MAT/STR)] N86-17473
Effect of carbon fiber surface treatment on moisture absorption and interlaminar shear strength of carbon fibre/epoxy resin composites
[RAE-TR-84047] N86-17474
The nature of charge carriers in electrorheological suspensions
[BR97662] N86-17500
An experimental verification of predicted current and voltage waveforms in a three-phase full-wave rectified bridge circuit with source resistance and inductance when driving a purely resistive load
[RAE-TR-83084] N86-17616
A smoke generator for the absolute calibration of gas turbine engine smoke sampling and measuring systems
[RAE-TM-P-1044] N86-17702
The Earth's atmosphere: Ideas old and new
[RAE-TM-SPACE-351] N86-17931

ROYAL ARMAMENT RESEARCH AND DEVELOPMENT ESTABLISHMENT, FORT HALSTEAD (ENGLAND).
Melt processable liquid crystal polymers. Part 1: A review of current developments
[RARDE-MEMO-50/84-PT-1] N86-17566

ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
A CO2 laser scintillometer for C(2) sub n measurements over a many kilometer path
[KNMI-TR-67] N86-17743
Deposition of sulfur in Europe: Methods to construct unbiased source-receptor matrices from data of a limited period (1976 - 1982). A meteorological contribution to the IIASA Regional Acidification Information and Simulation (RAINS) model
[KNMI-TR-66] N86-17923

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, BLINDERN.
Activities report in space research in Norway
[SAD-125-T] N86-17361

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, KJELLER.
The Norwegian Seismic Array (NORSAR)
[AD-A159820] N86-17933

ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
Microwave sensor design using CAD techniques
[AD-A159518] N86-17617
Modelling transmission gates in ELLA
[AD-A159557] N86-17618
SSMS: A Secure Software Management System
[AD-A159489] N86-18008
On the garbage collection of block structured memories
[RSRE-85006] N86-18043
Ultra-fast photoconductive switches
[RSRE-MEMO-3784] N86-18208
Nonlinear refractive index measurements of isotropic liquid crystals
[AD-A159519] N86-18209

RUHR UNIV., BOCHUM (WEST GERMANY).
Development and application of a direct algorithm adapted to the discrete Fourier transform for the determination of the modal parameters of linear vibration systems
[RUB-IFM-MITT-42] N86-17786
Theoretical and experimental investigations of a thermoplastic constitutive law
[RUB-IFM-MITT-43] N86-18233

S

SAN JOSE STATE UNIV., CALIF.
Application of linked three-dimensional Planetary Boundary Layer (PBL) and dispersion models to New York City N86-17904

SANDIA NATIONAL LABS., ALBUQUERQUE, N. MEX.
Introduction to deployable recovery systems
[DE86-000048] N86-17310
Total normal emittance measurements of highly conductive, opaque materials using a solar furnace
[DE85-016578] N86-17508
Photodecomposition of Mo(CO)6 adsorbed on Si(100)
[DE85-017818] N86-17510
Experimental study of the shock wave-turbulent boundary layer interaction
[DE85-016583] N86-17676
Vacuum arc remelting: An overview
[DE85-016458] N86-17751
Shock response spectrum at low frequencies
[DE85-018273] N86-17797
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876
Photovoltaic array performance simulation models
[DE85-016542] N86-17878
Sandia geothermal technology program: Interactions with other DOE research and CSDP
[DE85-017814] N86-17882
Multiwell Experiment Geophysics Program
[DE86-001147] N86-17940
A comparison of uncertainty and sensitivity analysis techniques for computer models
[TI85-013272] N86-18017
A FORTRAN 77 program and user's guide for the calculation of partial correlation and standardized regression coefficients
[TI85-016573] N86-18018
Making IGES work for CAD/CAM data exchange
[DE85-015570] N86-18024
Subroutine package for Bessel functions of a complex argument and nonnegative order
[DE86-000047] N86-18071
Neon gas puff Z-pinch implosions on Proto-2
[DE85-017636] N86-18194
Thermal shock behavior of beryllium limiters in Tokamak fusion devices
[DE85-017815] N86-18195
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211
GaAs/In/sub 0.25/Ga/sub 0.75As/GaAs, modulation-doped, single, strained quantum-well FET
[DE85-018272] N86-18221

SANDIA NATIONAL LABS., LIVERMORE, CALIF.
Solar thermal technology annual evaluation report, fiscal year 1984
[DE85-002950] N86-17876
Maximum performance of solar heat engines: Discussion of thermodynamic availability and other second law considerations and their implications
[DE85-018550] N86-18236

SARTORIUS G.M.B.H., GOETTINGEN (WEST GERMANY).
Application of surface acoustic wave resonators to quartz bending beams as integrated dilation recorders in balances (load cells)
[BMFT-FB-T-85-058] N86-17803

SATCOM INTERNATIONAL, PARIS (FRANCE).
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-1] N86-17365
Comparison of space segments for the provision of future data relay satellite services
[SATCOM-092/PSA/AB/173/84-VOL-2] N86-17366

SCIENCE APPLICATIONS, INC., PLEASANTON, CALIF.
TECATE: A code for anisotropic thermoelasticity in high-average-power laser technology, phase 1
[DE85-016067] N86-17736

SCIENCE APPLICATIONS INTERNATIONAL CORP., LA JOLLA, CALIF.
Aspects of turbulence in nonlinear systems, year one
[DE85-016253] N86-18188

SCIENCE APPLICATIONS INTERNATIONAL CORP., MCLEAN, VA.
Stochastic measurements and systems implications
[AD-A159827] N86-18122
Array positioning requirements
[AD-A159866] N86-18124

SCIENTIFIC CONSULTING SERVICES, PULLMAN, WASH.
Mathematical model for the distribution of the long-term efficiency of phase-change materials and its application in heat-storage
[DE85-016451] N86-17873

SELENIA S.P.A., ROME (ITALY).
A synchronized dc/dc converter for the data telemetry system of INTELSAT 6 N86-17440
A 20 GHz/30 W Traveling Wave Tube Amplifier (TWTA) for Olympus transponder N86-17454

SHANGHAI TRANSIT CO. (CHINA).
Calculation methods for short-circuit currents in three-phase bridge rectifier circuits N86-17444

SHIP RESEARCH INST., TOKYO (JAPAN).
Computation of the two-dimensinal incompressible Navier-Stokes equations using an implicit factored method N86-17277

SIEMENS A.G., MUNICH (WEST GERMANY).
Amorphous silicon solar cells, phase 2
[BMFT-FB-T-85-084] N86-17891

SOCIETE CREUSOT-LOIRE, LE CREUSOT (FRANCE).
Development of a single phase surface layer of TiN on steel
[REPT-1570] N86-17550
Study of the surface heat treatment of cutting tools and samples of grooved cylinders made by a laser beam. Comparison with an electron beam
[REPT-1578] N86-17551
Development of a manufacturing procedure to produce cold rolling cylinders by deposing a high alloy steel layer on a normal steel cylinder
[REPT-1645] N86-17588

SOCIETE CROUZET, VALENCE (FRANCE).
Design and development of a current limited solid state hybrid switch N86-17464
Elastic wave gyrometer
[REPT-26/5052] N86-17724

SOCIETE EUROPEENNE DE PROPULSION, VERNON (FRANCE).
Surface potential monitor
[SEP-TS/SE/RE/10418/84] N86-17378

SOCIETE NATIONALE DES POUDRES ET EXPLOSIFS, VERT-LE-PETIT (FRANCE).
Flexible intermediate film with a large temperature range for aeronautical utilization N86-17339
Visualization of interior ballistic phenomena
[SNPE-NT-27/85/CRB/NP] N86-17580

SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, LES MUREAUX (FRANCE).
Systems safety: Phantom or reality
[SNIAS-852-422-103] N86-17330
Study on a city's safety: Poitiers (France)
[SNIAS-852-422-104] N86-18257

SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, MARIGNANE (FRANCE).
The deiced super Puma
[SNIAS-852-210-104] N86-17328
Search and Rescue (SAR) System developed as part of the contract signed with the Irish Air Corps for the supply of 365 F Dauphin aircraft
[SNIAS-852-210-105] N86-17329
Strategies for dynamic modeling of a helicopter structure
[SNIAS-852-210-101] N86-17350
Helicopter cockpit organization for night vision
[SNIAS-852-210-103] N86-17996
Helicopter internal noise treatment. Recent methodolgies and practical applications
[SNIAS-852-210-102] N86-18133

SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, PARIS (FRANCE).
Analysis in simulated space environment of composite material behavior
[SNIAS-852-430-116] N86-17495
Ceramic fiber composites: Manufacturing and performances
[SNIAS-852-430-118] N86-17497
Numerical simulation of impact tests and comparison of behavior laws
[SNIAS-852-320-101] N86-17813

SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, SAINT-MEDARD-EN-JALLES (FRANCE).
Ceramic composites made by sol-gel processing
[SNIAS-852-430-103] N86-17491
Applications of holographic interferometry to nondestructive inspections of composite material structures
[SNIAS-852-430-112] N86-17492

Composite materials: A source of innovation
[SNIAS-852-430-113] N86-17493
Fatigue performance of prestressed composite pressure vessels
[SNIAS-852-430-114] N86-17494
Filament winding: An industrial procedure
[SNIAS-852-430-117] N86-17496
Design of nonaxysymmetric structures (turbojet engine nacelle element)
[SNIAS-852-430-119] N86-17498
Amorphous aluminum hydroxide gels
[SNIAS-852-430-104] N86-17561
Gelation of aluminum hydroxide sols
[SNIAS-852-430-19] N86-17562
Description of a nondestructive facility using holographic interferometry
[SNIAS-852-430-105] N86-17726
High pressure gas storage tanks: A compromise between safety regulations and performances
[SNIAS-852-430-115] N86-17768

SOUTH AFRICAN ASTRONOMICAL OBSERVATORY, CAPE PROVINCE.
South African Astronomical Observatory Circular No. 9
[SAAOC-9] N86-18271
Infrared observations of novae N86-18272
Photometry and radial velocities of 27 southern galactic Cepheids N86-18273
Optical and infrared photometry of southern early-type shell stars and pre-main-sequence variables N86-18274
Photometry of R Coronae Borealis and hydrogen-deficient carbon stars, 1982-3 N86-18275
CCD photometry of galactic clusters containing Cepheid variables. Paper 3: Photometry and identification charts for NGC 6067 N86-18276

SOUTH CAROLINA UNIV., COLUMBIA.
The use of acoustical caustics in fracture mechanics N86-17781
On the asymptotic properties of a kernel-type quantile estimator from censored samples
[AD-A160302] N86-18108

SOUTHAMPTON UNIV. (ENGLAND).
Activities report of the Institute of Sound and Vibration Research N86-17685
The application of optimal control methods to the deconvolution of velocity meter signals
[ISVR-TR-128] N86-17717
Wave propagation in thick damped laminated plates
[AASU-344] N86-17787

SPECTROLAB, INC., SYLMAR, CALIF.
Depletion layer recombination effects on the radiation damage hardness of gallium arsenide cells N86-17859

SPERRY RAND CORP., ST. PAUL, MINN.
Modeling and implementation of a digitally controlled power converter using duty ratio quantization N86-17461

SPIRE CORP., BEDFORD, MASS.
Further research on high open circuit voltage in silicon solar cells N86-17842

SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Investigation of electrochemical corrosion of semiconductors
[DE85-016853] N86-17541

STANFORD LINEAR ACCELERATOR CENTER, CALIF.
Recent results of the study of photon-photon collisions
[DE85-018110] N86-18140
Hadron production in e(+)e(-) annihilation at radical s = 29 GeV
[DE85-018410] N86-18147
Applications of quantum chromodynamics to hadronic and nuclear interactions
[DE86-000054] N86-18150

STANFORD UNIV., CALIF.
Direction of arrival estimation of eigenstructure methods with unknown sensor gain and phase
[AD-A160027] N86-18065
The indexing properties of an ancillary statistic
[AD-A160030] N86-18105
How many bootstraps?
[AD-A160043] N86-18106
Modified confidence intervals for the mean of an autoregressive process
[AD-A160055] N86-18107

STATE UNIV. OF NEW YORK, BUFFALO.
I-V-T analysis of radiation damage in high efficiency Si solar cells N86-17854
Influence of design variables on radiation hardness of silicon MINP solar cells N86-17855

STATE UNIV. OF NEW YORK, STONY BROOK.
Laminar forced convective heat transfer of power law fluids in isosceles triangular ducts with peripheral wall conduction N86-17659
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143

STICHTING VOOR FUNDAMENTEEL ONDERZOEK DER MATERIE, AMSTERDAM (NETHERLANDS).
Activities report in fundamental research on matter (FOM) N86-18118

STOCKHOLM UNIV. (SWEDEN).
The red band spectrum of gaseous CaH. Molecular equilibrium ground state constants. Term values of the A(2)Pi, B(2)Sigma, and X(2)Sigma states
[USIP-85-13] N86-18164
The NA27 trigger
[USIP-85-10] N86-18172
Commutator of the quark mass matrices in the standard electroweak model and a measure of maximal CP-violation
[USIP-85-14] N86-18173
The F meson background and F candidates in 360 GeV c/Pi(-) p and pp interactions
[USIP-85-15] N86-18174
Treatment of strange particle decays observed in the UA5 streamer chambers
[USIP-85-16] N86-18175

STRUCTURAL MECHANICS ASSOCIATES, INC., NEWPORT BEACH, CALIF.
Engineering characterization of ground motion. Task 2: Effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects
[TI85-901169] N86-17796

SUSSEX UNIV., BRIGHTON (ENGLAND).
Oxyluminescence study of the degradation of filled and unfilled rubbers
[BR94542] N86-17567

SWEDISH SPACE CORP., SOLNA.
Utilization of the Swedish experiment module within the TEXUS 9/10 flight opportunity
[M5/7-14] N86-17363

SYRACUSE UNIV., N. Y.
Catalytic reactivity of thin crystal surfaces
[DE85-018293] N86-18228
Study of free-index phrases
[PB85-240117] N86-18253

T

TECHNICAL RESEARCH CENTRE OF FINLAND, ESPOO.
Simulation of flame acceleration in unconfined vapor cloud explosions
[VTT-RR-357] N86-17698

TECHNISCHE HOCHSCHULE, AACHEN (WEST GERMANY).
Recovery circuit for snubber energy in power electronic applications with high switching frequencies N86-17451

TECHNISCHE HOCHSCHULE, DARMSTADT (WEST GERMANY).
Study of plate impedances
[ESA-CR(P)-2086] N86-17802
Formulation of a one-dimensional boundary integral equation for three-dimensional elastostatic corner problems
[PREPRINT-886] N86-18083
A difference procedure to solve quasilinear plasma physics parabolic systems
[PREPRINT-892] N86-18204

TECHNISCHE HOGESCHOOL, DELFT (NETHERLANDS).
Low speed aerodynamic characteristics of a two-dimensional sail wing with adjustable slack of the sail
[VTH-LR-307] N86-17314
Design and fabrication of an advanced composite cellular wing box
[VTH-LR-315] N86-17344
Lecture notes on fatigue, static tensile strength and stress corrosion of aircraft materials and structures. Part 2: Figures
[VTH-LR-360-PT-2] N86-17345
The dynamics of mechanisms with deformable links
[LAB-REPT-758] N86-17790
The dynamics of mechanisms with deformable links N86-17791
Finite element kinematic analysis of spatial mechanisms N86-17792
The SPACAR program system for the analysis of the motion of spatial mechanisms. User manual
[LAB-REPT-739] N86-17793
Automatic crack length measurements by the electrical potential drop method with computer control
[VTH-LR-309] N86-17805
Design of hat-stiffened composite panels under uniaxial compression and shear. Minimum mass optimization based on a simplified theory
[VTH-LR-312] N86-17806
The effect of blunt notches and saw cuts on the static strength of 2024-T3 and 7075-T6 sheet material
[VTH-LR-313] N86-17807
The rotating disk and the yield conditions of Tresca and von Mises
[LAB-REPT-759] N86-17810
A double-curved triangular shell element allowing the analysis of shell problems in the plastic domain
[LAB-REPT-761] N86-17811
The biomorphic model of the human pilot
[VTH-LR-310] N86-17991
On the numerical evaluation of Bessel functions of first, second and third kind of complex argument and integer orders
[MEAH-54] N86-18097
Performance evaluation of nonlinear optimization methods via pairwise comparison and fuzzy number
[REPT-84-40] N86-18098
An automatic proof procedure for several geometries (report 1)
[REPT-84-42] N86-18099
An introductory comparative study of the Hopf bifurcation method and the Dee harmonic balance method
[LAB-REPT-757] N86-18113

TECHNISCHE HOGESCHOOL, EINDHOVEN (NETHERLANDS).
Weld seam-tracking with an optical sensor using structured light N86-17764
Some aspects of the dynamic behavior of an assembly robot N86-17765
Structural and parametric identification of Multiple Input Multiple Output program guide (MIMO) systems according to Guidorzi N86-18038
Structural and parametric identification of Multiple Input Multiple Output (MIMO) sustems according to Guidorzi, program guide N86-18039
Structural and parametric identification of Multiple Input Multiple Output (MIMO) systems according to Guidorzi. Further developments and applications N86-18040
Design for a path control algorithm of a robot arm with external sensor control N86-18057
A generalized diagram for various parameter estimation methods; the coherence in pseudo-linear regression schemes
[ER-83/07] N86-18095
A Markovian model, with state-dependent parameters, of a transactional system supported by checkpointing and recovery strategies N86-18110

TECHNISCHE HOGESCHOOL, TWENTE (NETHERLANDS).
Scale model of the SWD 5000 LW rotor wind tunnel tests for different blade setting angles
[WM-074] N86-17313
Free vibrations of finite flexible shells and tubes in axial flow N86-17804
Activities report in windmill research
[WM-068] N86-17838
The CWD 4000 project (formerly THT-1)
[WM-075] N86-17888
Activities report on the Technical Highschool Twente (THT) CWD windmill project
[WM-090] N86-17889

TECHNISCHE PHYSISCHE DIENST TNO-TH, DELFT (NETHERLANDS).
Activities report in applied physics N86-18119

TECHNISCHE UNIV., BERLIN (WEST GERMANY).
Systems analysis of solid fuel nuclear engines in cislunar space
[ILR-MITT-142] N86-18171

TECHNISCHE UNIV., MUNICH (WEST GERMANY).
Difference methods of higher order for elliptic boundary value problems with curved boundaries
[TUM-I8411] N86-18059

TEXAS A&M UNIV., COLLEGE STATION.
The mechanics of a near-surface crack under uniform pressure or shear in a transversely isotropic medium: With applications to hydraulic fracture N86-17780
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148

TEXAS UNIV., AUSTIN.
Drift modes with differential rotation and passing electrons
[DE85-017243] N86-18151
Antenna analysis and boundary conditions for Alfven wave studies in tokamaks
[DE85-018011] N86-18196
Simultaneous measurement of current and plasma density profiles in the TEXT Tokamak
[DE85-017679] N86-18200
Two and three dimensional particle simulation models for study of plasma microinstabilities
[DE86-000238] N86-18201
Three dimensional toroidal magnetohydrodynamic particle code
[DE86-000239] N86-18202
Polar fluids: Photoemission and electronic energy levels
[DE85-016974] N86-18227

THORN EMI, HAYES (ENGLAND).
A high power, pulsed microwave tube for a synthetic aperture radar electrical model. Phase 2: Manufacture and test
[EVT-852] N86-17632
TOKYO UNIV. (JAPAN).
An interactive design system for winged space vehicle N86-17269
Direct simulation of the incompressible flow at high Reynolds number by finite difference method N86-17276
TOULOUSE UNIV. (FRANCE).
Use of impedance measurements to model nickel-cadmium batteries N86-17446
Improvement of the process for electrochemical impregnation of nickel hydroxide electrodes N86-17447
TRANSMISSION RESEARCH, INC., CLEVELAND, OHIO.
Constitutive modelling of lubricants in concentrated contacts at high slide to roll ratios
[NASA-CR-175029] N86-17748
TRANSPORTATION RESEARCH BOARD, WASHINGTON, D.C.
International Symposium on Mechanical Properties of Special Concrete
[PB85-234961] N86-17770
TRW, INC., REDONDO BEACH, CALIF.
Array technology and applications N86-17872
TSUKUBA UNIV. (JAPAN).
Current status of research on evolution of longitudinal vortices in wall turbulence N86-17272
TURKU UNIV. (FINLAND).
How do galaxies make spiral arms: Stochastic versus gravitational N86-18262

U

ULTRAMET, PACOIMA, CALIF.
Oxidation resistant coatings for refractory metals N86-17399
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, CULCHETH (ENGLAND).
Dispersion of heavy gases N86-17899
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, CULHAM (ENGLAND).
Liquid metal field emission thrusters and ion sources: A review
[ESA-CR(P)-2078] N86-17470
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL (ENGLAND).
Chemical and microstructural effects on the diffusional creep behaviour of AISI type 316 stainless steel
[AERE-R-11322] N86-17563
The influence of heat affected zone microstructures on the ductility and hydrogen embrittlement of 9 percent Cr 1 percent Mo steel
[AERE-R-11473] N86-17564
Improved separators for silver-hydrogen cells
[AERE-R-11513] N86-17633
The use of ultrasonic wave attenuation to monitor polymer and composite quality
[AERE-R-11704] N86-17777
UNITED TECHNOLOGIES CORP., SAN JOSE, CALIF.
Cracked ballistic grain tests and analysis N86-17383
Thrust measurements for ramjet performance documentation N86-17401
Improved space motor demonstration N86-17413
IUS propulsion status N86-17415
UNIVERSIDAD POLITECNICA DE MADRID (SPAIN).
Multiprimary winding inverter with low harmonic content N86-17439
UNIVERSITY COLL., LONDON (ENGLAND).
Applications and scientific uses of ERS-1 radar altimeter data
[ESA-CR(P)-2084] N86-17823
UPPSALA IONOSPHERIC OBSERVATORY (SWEDEN).
Activities report in geophysics
[UIO-SR-85-01] N86-18203
UTAH UNIV., SALT LAKE CITY.
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 1: Kinematics of Basin-Range intraplate extension
[NASA-CR-176498] N86-17928
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 2: Lithospheric structure, seismicity, and contemporary deformation of the United States Cordillera
[NASA-CR-176499] N86-17929
A study of tectonic activity in the Basin-Range Province and on the San Andreas Fault. No. 3: Kinematics of Great Basin intraplate extension from earthquake, geodetic and geologic information
[NASA-CR-176500] N86-17930

V

VACUUMSCHMELZE G.M.B.H., BERLIN (WEST GERMANY).
Fast magnetic systems, basic research
[BMFT-FB-T-85-102] N86-18117
VARIAN ASSOCIATES, PALO ALTO, CALIF.
High-efficiency AlGaAs-GaAs Cassegrainian concentrator cells N86-17845
VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Vorticity shedding over two-dimensional bodies N86-17656
Closure of fatigue cracks at high strains
[NASA-CR-175021] N86-17788
VIRGINIA UNIV., CHARLOTTESVILLE.
Electrochemical behavior of graphite fiber-polymer composites
[AD-A160031] N86-17478
Research in computer science
[NASA-CR-176486] N86-17998
Investigation of the quantum efficiency of optical heterodyne detectors
[NASA-CR-176489] N86-18179
VON KARMAN INST. FOR FLUID DYNAMICS, RHODE-SAINT-GENESE (BELGIUM).
Investigation of an oblique shock wave/laminar boundary layer interaction using Laser Doppler Velocimetry (LDV)
[VKI-TN-152] N86-17680
A two-dimensional model for boiling in an active particle bed: BOIL
[VKI-TN-153] N86-17681
An improved pressure iteration procedure for the SOLA algorithm applied to the solution of the incompressible Navier-Stokes equations
[VKI-TM-35] N86-17682
Pollutant dispersal
[VKI-LS-1985-02] N86-17895
Fluctuating wind effects N86-17900
Lagrangian modeling of turbulent dispersion N86-17901

W

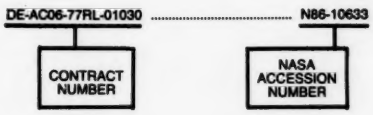
WAGENINGEN AGRICULTURAL UNIV. (NETHERLANDS).
The 1984 L-band radar experiment. Part 1: Ground truth Flevo (Netherlands) 1984 N86-17609
WASHINGTON STATE UNIV., PULLMAN.
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148
WASHINGTON UNIV., ST. LOUIS, MO.
Effect of dynamic stall and elastic parameters on the fundamental mechanisms of helicopter vibrations
[AD-A160022] N86-17355
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152
WAYNE STATE UNIV., DETROIT, MICH.
Fault analysis in dynamic systems with application to reciprocating combustion engines N86-17746
WESTINGHOUSE ELECTRIC CORP., SUNNYVALE, CALIF.
Moonburner: An ultra-high web fraction grain design N86-17392
WISCONSIN UNIV., MILWAUKEE.
Heat transfer from a high temperature condensable mixture. 2: Sedimentation of fog condensate
[DE85-018377] N86-17673
WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
An inverse method for obtaining the attenuation profile and small variations in the sound speed and density profiles of the ocean bottom
[AD-A159848] N86-18123
WOODWARD-CLYDE CONSULTANTS, WALNUT CREEK, CALIF.
Engineering characterization of ground motion. Task 2: Effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects
[TI85-901169] N86-17796
WORLD METEOROLOGICAL ORGANIZATION, GENEVA (SWITZERLAND).
World weather watch: On implementation
[WMO-639] N86-17958
Activities report in world meteorology
[WMO-644] N86-17959
International list of selected, supplementary and auxiliary ships
[WMO-47-ED-85] N86-17971
Guide to the automation of data-processing centers
[WMO-636] N86-18003

WYLE LABS., INC., HAMPTON, VA.
Operational considerations in monitoring oxygen levels at the National Transonic Facility
[NASA-CR-3953] N86-17359
WYOMING UNIV., LARAMIE.
Class E frequency multipliers N86-17615

Y

YALE UNIV., NEW HAVEN, CONN.
Electromagnetic wave interactions with metallic microparticles: Experiments with fibers and flakes
[AD-A158468] N86-17533
An explicit scheme for the prediction of ocean acoustic propagation in three dimensions
[AD-A160053] N86-18125
Phenomenology of new particle production in heavy-ion collisions
[DE85-016372] N86-18137

Typical Contract Number Index Listing

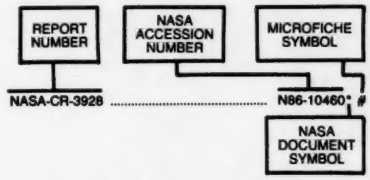


Listings in this index are arranged alphanumerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF PROJ. 2304 ..... N86-18100
AF PROJ. 2418 ..... N86-17534
AF-AFOSR-0023-80 ..... N86-18210
AF-AFOSR-0132-84 ..... N86-18016
AF-AFOSR-0135-82 ..... N86-18100
AF-AFOSR-0156-84 ..... N86-18108
AF-AFOSR-0243-81 ..... N86-18180
AFOSR-83-0273 ..... N86-17680
AFOSR-84-0092 ..... N86-17481
ARE-2043/080 ..... N86-17529
ARPA ORDER 1483 ..... N86-17933
A79/KL/151 ..... N86-17986
N86-18187
A81/K/041 ..... N86-17992
A81/K/145 ..... N86-18131
A81/KL/116 ..... N86-17723
DA PROJ. 1L1-61102-AH-43 ..... N86-17749
DA PROJ. 1L2-63102-DO-71 ..... N86-17535
DA PROJ. 2Q2-63744795 ..... N86-18104
DA PROJ. 3M1-61102-BS-10 ..... N86-17981
DA PROJ. 4A1-61101-A-91-D N86-17932
DAAG29-82-K-0040 ..... N86-17533
DAAG29-82-K-0053 ..... N86-17478
DAAG29-83-K-0133 ..... N86-17355
DAAG29-84-K-0005 ..... N86-18100
N86-18103
DAAG29-84-K-0030 ..... N86-18107
DAAG29-84-K-0034 ..... N86-17732
DAAG46-83-C-0178 ..... N86-17535
DAAH01-82-C-A121 ..... N86-17383
DAMD17-81-C-1178 ..... N86-17981
DE-AC02-76CH-00016 ..... N86-17511
N86-17516
N86-17545
N86-17582
N86-17584
N86-17627
N86-17630
N86-17671
N86-17712
N86-17714
N86-18141
N86-18153
N86-18154
N86-18213
N86-18220
DE-AC02-76CH-03000 ..... N86-18165
N86-18166
N86-18167
N86-18168
DE-AC02-76ER-02296 ..... N86-17549
DE-AC02-76ER03074 ..... N86-18137
DE-AC02-78ET-51013 ..... N86-18192
DE-AC02-81ER10996 ..... N86-18125
DE-AC02-82ER-13026 ..... N86-17879
DE-AC02-83CH-10093 ..... N86-17541
N86-17578
N86-17625
N86-17677
N86-17752
N86-17875
N86-17876
N86-17877
N86-17880
N86-17881
N86-18215
N86-18216
N86-18217
N86-18218
N86-18219
DE-AC02-83CH-10139 ..... N86-17822
N86-17936
N86-17937
N86-17938
N86-17939
DE-AC02-84ER-40125 ..... N86-18169
DE-AC03-76SF-00098 ..... N86-17538
N86-17710
N86-17735
N86-17798
N86-18068
N86-18138
N86-18154
N86-18191
DE-AC03-76SF-00515 ..... N86-18140
N86-18150
DE-AC03-78ET-20110 ..... N86-17675
DE-AC03-84ER-13174 ..... N86-18188
DE-AC03-84ER-53158 ..... N86-18200
DE-AC04-76DP-00613 ..... N86-17750
N86-18001
DE-AC04-76DP-00789 ..... N86-17310
N86-17508
N86-17510
N86-17676
N86-17797
N86-17878
N86-17882
N86-17940
N86-17978
N86-18017
N86-18024
N86-18071
N86-18194
N86-18195
N86-18211
N86-18221
DE-AC04-76DR-00789 ..... N86-18236
DE-AC05-76ET-53036 ..... N86-18196
DE-AC05-78ET-53043 ..... N86-18196
DE-AC05-84ER-53170 ..... N86-18197
DE-AC05-84OR-21400 ..... N86-17505
N86-17539
N86-17542
N86-17547
N86-17570
N86-17572
N86-17585
N86-17626
N86-17669
N86-17670
N86-17709
N86-17755
N86-17795
N86-17884
N86-17885
N86-17906
N86-17911
N86-17989
N86-17990
N86-18002
N86-18022
N86-18069
N86-18070
N86-18137
N86-18142
N86-18189
N86-18190
N86-18198
N86-18234
N86-18246
DE-AC05-84OS-21400 ..... N86-17772
DE-AC05-84OU-21400 ..... N86-17512
DE-AC06-76FF-02170 ..... N86-18026
DE-AC06-76RL-01830 ..... N86-17546
N86-17548
N86-17756
N86-17905
N86-17907
N86-17908
N86-17910
N86-17935
N86-18141
N86-18212
DE-AC08-80DP-40124 ..... N86-17742
DE-AC08-83NV-10282 ..... N86-18181
DE-AC11-76PN-00014 ..... N86-18020
DE-AI01-76PR-06010 ..... N86-17873
DE-AI01-77CS-51040 ..... N86-17531
DE-AS05-77ER-05490 ..... N86-18116
N86-18237
DE-AS05-78ET-52025 ..... N86-17599
N86-18193
DE-AS05-81ER-10890 ..... N86-18227
DE-AS05-85ER-53193 ..... N86-18196
DE-AS08-84DP-40199 ..... N86-17624
DE-AS20-82LC-10845 ..... N86-17506
DE-FC22-83FE-60339 ..... N86-17513
DE-FG02-84ER-45139 ..... N86-18226
DE-FG03-84ER-13300 ..... N86-17514
DE-FG05-80ET-53088 ..... N86-18151
N86-18201
N86-18202
N86-18238
DE-FG05-85ER-53192 ..... N86-18195
DE-FG07-82CE-40545 ..... N86-17509
DE-FG44-81R4-10501 ..... N86-18254
DEN3-35 ..... N86-17748
DEN3-363 ..... N86-17531
DRET-82-S-0937 ..... N86-17575
DRET-82-S-0938 ..... N86-17575
DRET-82-S-0939 ..... N86-17575
DRET-82-226 ..... N86-17580
DRET-83-34-134 ..... N86-17692
DRET-83-025 ..... N86-18129
DRET-83-056 ..... N86-17724
DRET-83-123 ..... N86-17637
DRET-83-129 ..... N86-17339
DRET-83-177 ..... N86-17580
DRET-84-34-001 ..... N86-17356
N86-17488
N86-17693
DRET-84-95-006 ..... N86-17315
DRET-84/001 ..... N86-17639
EPA-68-02-4063 ..... N86-17963
ESA-1-1571/83/NL-DG N86-17366
ESA-1571/83/NL-DG N86-17365
ESA-3400/79/NL-HP(SC) N86-17601
ESA-4618/81/NL-PP N86-17716
ESA-5070/82/NL-PD(SC) N86-17632
ESA-5231/82/F-RD(SC) N86-17332
ESA-5478/83/NL-BI(SC) N86-17633
ESA-5681/83/NL-BI N86-18028
ESA-5754/84/F-RD(SC) N86-17374
ESA-5801/83/F-FC(SC) N86-17362
ESA-5854/84/F-HEW N86-17363
ESTEC-3663/78/NL-HP N86-17378
ESTEC-4462/80/NL-AK(SC) N86-17470
ESTEC-4487/80/NL-HP(SC) N86-17718
ESTEC-5246/82/NL-PP(SC) N86-18029
ESTEC-5683/83/NL-PP(SC) N86-17802
ESTEC-5684/83/NL-BI N86-17823
ESTEC-5778/83/NL-MS N86-17825
N86-17826
ESTEC-5802/83/F-FC(SC) N86-17364
FMV-F-K-81713-75-038-07-001 ..... N86-17318
FMV-F-K-82223-75-007-07-001 ..... N86-17316
FMV-F-K-82223-76-001-21-001 ..... N86-17316
N86-17317
N86-17318
FMV-F-K-82223-80-001-21-001 ..... N86-17316
FMV-F-K-84302-73-042-07-001 ..... N86-17317
F04611-80-C-0039 ..... N86-17428
F04611-84-C-0043 ..... N86-17399
F04701-C-0040 ..... N86-17415
F04701-83-C-0084 ..... N86-17622
F08606-84-C-0002 ..... N86-17933

F08606-84-C-0029 ..... N86-17412
F08635-82-C-0001 ..... N86-17389
F19628-81-K-0043 ..... N86-17598
F19628-84-K-0010 ..... N86-17597
F33615-81-C-2058 ..... N86-17858
F33615-84-C-2486 ..... N86-17847
F49620-79-C-0058 ..... N86-18065
F49620-80-C-001 ..... N86-18014
F49620-84-C-0092 ..... N86-17668
F49620-85-C-0008 ..... N86-18066
N86-18067
IS-83.1757 ..... N86-17560
ISMAT-200 ..... N86-17799
JPL-956615 ..... N86-17883
JPL-957030 ..... N86-17594
MDA903-82-C-0414 ..... N86-18104
MDA903-85-C-0030 ..... N86-18010
MOD-D/ER1/9/4/2120/046-AMTE-HH N86-17567
M09-33 ..... N86-17704
NAG1-242 ..... N86-17998
NAG1-262 ..... N86-18179
NAG1-613 ..... N86-17351
NAG3-230 ..... N86-17665
NAG3-422 ..... N86-17844
NAG3-438 ..... N86-17788
NAG5-164 ..... N86-17928
N86-17929
N86-17930
NAG5-526 ..... N86-17731
NASW-4003 ..... N86-17372
NASW-4004 ..... N86-17338
NASW-4006 ..... N86-17370
NAS1-16331 ..... N86-17359
NAS1-17070 ..... N86-17997
NAS1-18107 ..... N86-17997
NAS3-23260 ..... N86-17408
NAS3-23772 ..... N86-17387
N86-17416
NAS3-23858 ..... N86-17418
NAS3-23876 ..... N86-17845
NAS5-27832 ..... N86-17816
NAS7-100 ..... N86-17883
NAS7-918 ..... N86-17395
NAS8-34731 ..... N86-17703
NAS8-35334 ..... N86-17502
NAS8-35362 ..... N86-17502
NAS8-35593 ..... N86-17502
NAS8-36107 ..... N86-17419
NAS13-200 ..... N86-17815
NCC2-293 ..... N86-17358
NGR-47-003-052 ..... N86-17475
NIVR-312.2-1746 ..... N86-17808
NIVR-1816 ..... N86-17347
NIVR-1819 ..... N86-17321
NIVR-1833 ..... N86-17695
NIVR-1892 ..... N86-17809
NIVR-1899 ..... N86-17346
NIVR-1901 ..... N86-17320
NIVR-1910 ..... N86-17376
NIVR-1944 ..... N86-17321
NIVR-1947 ..... N86-17348
NIVR-1979 ..... N86-18042
NR PROJ. RR0-1109 ..... N86-17733
NSF IST-82-11348 ..... N86-18253
NSF MCS-82-01768 ..... N86-18078
NSF MCS-82-03483 ..... N86-18107
NSG-1562 ..... N86-17476
NSG-1577 ..... N86-18061
N00014-76-C-0013 ..... N86-18015
N00014-76-C-0475 ..... N86-18105
N86-18106
N00014-79-C-0670 ..... N86-17503
N86-17504
N86-17620
N00014-80-C-0322 ..... N86-18101
N00014-80-C-0957 ..... N86-17733
N00014-82-C-0152 ..... N86-18123
N00014-82-K-0184 ..... N86-18125
N00014-83-K-0611 ..... N86-17569
N00014-85-C-0084 ..... N86-18122
N86-18124
N00014-85-G-0093 ..... N86-18242
N00014-85-K-0004 ..... N86-17976
N86-17977
N00024-85-C-5301 ..... N86-17380
N61339-81-C-0105 ..... N86-17705
PHS-AI-17687 ..... N86-17976
RARDE-2062/0111 ..... N86-17785
RB-RLB-1982-1-3.3 ..... N86-17354
RB-RLD-82-4.1 ..... N86-17915
N86-17916
RB-RLD-82-5.2 ..... N86-17917
N86-17918
RB-RLD-82/83-4.1 ..... N86-17920
RB-RLD-83-4.1 ..... N86-17921
N86-17922
RB-RLD-84-4.1 ..... N86-17919
SR-028-B N86-17897
STPA-81-96-027 ..... N86-17552
STPA-83-96-028 ..... N86-17484
N86-17485
N86-17486
N86-17487
STPA-84-95015 ..... N86-17340
W-31-109-ENG-38 ..... N86-17479
N86-17517
N86-17540
N86-17543
N86-17544
N86-17573
N86-17623
N86-17629
N86-17673
N86-17674
N86-17715
N86-17741
N86-17757
N86-17909
N86-17912
N86-17913
N86-17979
N86-18126
N86-18143
N86-18144
N86-18145
N86-18146
N86-18147
N86-18148
N86-18170
N86-18222
N86-18223
N86-18224
N86-18225
N86-18226
N86-18229
N86-18230
N86-18231
N86-18232
N86-18235
N86-18247
N86-18278
W-7405-ENG-36 ..... N86-17536
N86-17583
N86-17708
N86-17713
N86-17734
N86-17737
N86-17738
N86-17740
N86-17754
N86-18019
N86-18053
N86-18139
N86-18155
N86-18158
N86-18182
N86-18183
N86-18186
N86-18214
W-7405-ENG-48 ..... N86-17402
N86-17507
N86-17515
N86-17628
N86-17672
N86-17706
N86-17707
N86-17711
N86-17736
N86-17739
N86-17794
N86-17956
N86-17957
N86-18023
N86-18025
N86-18049
N86-18114
N86-18115
N86-18149
N86-18152
N86-18156
N86-18157
N86-18184
N86-18185
N86-18245
N86-18281
W-7405-ENG-83 ..... N86-17537
307-02-03-07 ..... N86-18179
352-02-03 ..... N86-18277
505-31-83-01 ..... N86-17359
505-31-83-01 ..... N86-17997
505-31-83-02 ..... N86-18060
505-33-7C N86-17788
505-34-01 ..... N86-17358
505-36-22 ..... N86-17665
505-63-11 ..... N86-17789
506-43-11 ..... N86-17472
506-49-31-01 ..... N86-17373
506-55-42 ..... N86-17839
506-58-22 ..... N86-17368
650-60-20 ..... N86-17595

Typical Report Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-11 ..... N86-18047
A-12 ..... N86-18048
A-13 ..... N86-18007

AASU-344 ..... N86-17787 #

AD-A156647 ..... N86-18242 #
AD-A156772 ..... N86-17981 #
AD-A156999 ..... N86-17749 #
AD-A158468 ..... N86-17533 #
AD-A158996 ..... N86-18100 #
AD-A159489 ..... N86-18008 #
AD-A159518 ..... N86-17617 #
AD-A159519 ..... N86-18209 #
AD-A159557 ..... N86-17618 #
AD-A159602 ..... N86-17950 #
AD-A159603 ..... N86-17951 #
AD-A159776 ..... N86-17667 #
AD-A159779 ..... N86-17534 #
AD-A159785 ..... N86-18101 #
AD-A159792 ..... N86-17596 #
AD-A159802 ..... N86-17999 #
AD-A159806 ..... N86-17975 #
AD-A159807 ..... N86-17932 #
AD-A159808 ..... N86-17821 #
AD-A159811 ..... N86-17982 #
AD-A159812 ..... N86-18102 #
AD-A159813 ..... N86-18009 #
AD-A159816 ..... N86-17969 #
AD-A159817 ..... N86-17732 #
AD-A159819 ..... N86-17619 #
AD-A159820 ..... N86-17933 #
AD-A159821 ..... N86-18010 #
AD-A159822 ..... N86-18000 #
AD-A159824 ..... N86-18011 #
AD-A159826 ..... N86-17620 #
AD-A159827 ..... N86-18122 #
AD-A159847 ..... N86-17569 #
AD-A159848 ..... N86-18123 #
AD-A159855 ..... N86-17621 #
AD-A159856 ..... N86-18012 #
AD-A159862 ..... N86-17597 #
AD-A159863 ..... N86-17952 #
AD-A159864 ..... N86-17953 #
AD-A159865 ..... N86-17954 #
AD-A159866 ..... N86-18124 #
AD-A159869 ..... N86-17535 #
AD-A160017 ..... N86-18013 #
AD-A160018 ..... N86-18014 #
AD-A160019 ..... N86-17976 #
AD-A160020 ..... N86-18103 #
AD-A160022 ..... N86-17355 #
AD-A160027 ..... N86-18065 #
AD-A160029 ..... N86-18104 #
AD-A160030 ..... N86-18105 #
AD-A160031 ..... N86-17478 #
AD-A160032 ..... N86-17955 #
AD-A160033 ..... N86-17503 #
AD-A160034 ..... N86-17504 #
AD-A160040 ..... N86-17970 #
AD-A160043 ..... N86-18106 #
AD-A160044 ..... N86-17622 #
AD-A160053 ..... N86-18125 #
AD-A160054 ..... N86-17704 #
AD-A160055 ..... N86-18107 #
AD-A160059 ..... N86-17977 #
AD-A160060 ..... N86-18015 #
AD-A160299 ..... N86-17705 #
AD-A160301 ..... N86-18066 #
AD-A160302 ..... N86-18108 #
AD-A160303 ..... N86-17733 #
AD-A160304 ..... N86-17668 #
AD-A160305 ..... N86-18067 #
AD-A160310 ..... N86-18210 #
AD-A160311 ..... N86-18180 #
AD-A160312 ..... N86-17598 #
AD-A160313 ..... N86-18016 #
AD-A161084 ..... N86-17380

AD-E950724 ..... N86-17749 #

AEDC-TR-85-43 ..... N86-17667 #

AERE-R-11322 ..... N86-17563 #
AERE-R-11473 ..... N86-17564 #
AERE-R-11513 ..... N86-17633 #
AERE-R-11704 ..... N86-17777 #

AFOSR-85-0674TR ..... N86-18100 #
AFOSR-85-0756TR ..... N86-18065 #
AFOSR-85-0804TR ..... N86-18014 #
AFOSR-85-0808TR ..... N86-18016 #
AFOSR-85-0823TR ..... N86-18067 #
AFOSR-85-0853TR ..... N86-18180 #
AFOSR-85-0864TR ..... N86-18066 #
AFOSR-85-0865TR ..... N86-18108 #
AFOSR-85-0873TR ..... N86-17668 #
AFOSR-85-0879TR ..... N86-18210 #

AFWAL-TR-85-4052 ..... N86-17534 #

AMMRC-TR-85-15 ..... N86-17535 #

AMTE(M)-84520 ..... N86-17974

ANL-HEP-CP-85-83 ..... N86-18148 #

ANL/FE-85-1 ..... N86-17479 #

ANL/OEPM-85-3 ..... N86-17629 #

AR-7 ..... N86-18180 #

ARB-R-85-251 ..... N86-17925 #

ARE(M6)-TM-83818 ..... N86-17987

ARI-TR-681-VOL-3 ..... N86-18104 #

ARO-18489.1-MS ..... N86-17478 #
ARO-18567.25-PH ..... N86-17533 #
ARO-20538.3-EG ..... N86-17355 #
ARO-20927.9-MA ..... N86-18107 #
ARO-20980.30-MA ..... N86-18103 #
ARO-21574.1-PH ..... N86-17732 #

B-21770 ..... N86-17964 #

BAE-ARG-200 ..... N86-17666 #

BDX-613-3282 ..... N86-18001 #
BDX-613-3317 ..... N86-17750 #

BL/TN/A/35 ..... N86-17688 #

BLL-BISI-23009-(9022.060) N86-17526
BLL-BISI-23037-(9022.060) N86-17527

BLL-DRIC-T-TR-7561-(3623.66) N86-17525

BLL-M-36380-(5828.4) N86-17524
BLL-M-36390-(5828.4) N86-17745
BLL-M-36490-(5828.4) N86-17522
BLL-M-36491-(5828.4) N86-17523
BLL-RISLEY-TR-5166-(9091.9F) N86-17744
BLL-RISLEY-TR-5206-(9091.9F) N86-17747
BLL-RISLEY-TR-5229-(9091.9F) N86-17782
BLL-RISLEY-TR-5232-(9091.9F) N86-17784
BLL-RISLEY-TR-5233-(9091.9F) N86-17783

BLL-TRANS-3225-(9057.2451) N86-17778

BLRDR-5845 ..... N86-18005 #

BMFT-FB-T-85-058 ..... N86-17803 #
BMFT-FB-T-85-059 ..... N86-17635 #
BMFT-FB-T-85-064 ..... N86-17763 #
BMFT-FB-T-85-068 ..... N86-17720 #
BMFT-FB-T-85-069 ..... N86-17577 #
BMFT-FB-T-85-077 ..... N86-17887 #
BMFT-FB-T-85-084 ..... N86-17891 #
BMFT-FB-T-85-086 ..... N86-17483 #
BMFT-FB-T-85-087 ..... N86-17558 #
BMFT-FB-T-85-092 ..... N86-17892 #
BMFT-FB-T-85-094 ..... N86-17773 #
BMFT-FB-T-85-096 ..... N86-17893 #
BMFT-FB-T-85-099 ..... N86-17559 #
BMFT-FB-T-85-102 ..... N86-18117 #

BMFT-FB-W-85-010 ..... N86-17353 #

BMI-1985-080 ..... N86-17760 #

BNL-36704 ..... N86-18213 #
BNL-36733 ..... N86-17511 #
BNL-36742 ..... N86-17582 #
BNL-36774 ..... N86-18154 #
BNL-36821 ..... N86-18153 #
BNL-36858 ..... N86-18220 #
BNL-36868 ..... N86-17516 #
BNL-36903 ..... N86-17714 #
BNL-36904 ..... N86-17627 #
BNL-36949 ..... N86-17584 #
BNL-36969 ..... N86-17712 #
BNL-51910 ..... N86-17545 #

BOSS-010-MT ..... N86-17362 #
BOSS-1985 ..... N86-17697 #

BRL-TR-2648 ..... N86-17749 #

BR93987 ..... N86-17586
BR94080 ..... N86-17785
BR94139 ..... N86-17987
BR94397 ..... N86-17529
BR94478 ..... N86-17306
BR94542 ..... N86-17567
BR94557 ..... N86-18208
BR94710 ..... N86-17974
BR94905 ..... N86-17474
BR94907 ..... N86-17473
BR95024 ..... N86-17702
BR95132 ..... N86-17986
BR95243 ..... N86-17616
BR95552 ..... N86-18043
BR95787 ..... N86-17336
BR95846 ..... N86-17337
BR96009 ..... N86-17307
BR96188 ..... N86-17931 #
BR96521 ..... N86-18209 #
BR96524 ..... N86-17618 #
BR96554 ..... N86-18008 #
BR96601 ..... N86-17309 #
BR96714 ..... N86-17617 #
BR97661 ..... N86-17471 #
BR97662 ..... N86-17500 #

B8562578 ..... N86-17636 #
B8563366 ..... N86-17890 #
B8563474 ..... N86-17345 #
B8564311 ..... N86-17924 #
B8564312 ..... N86-17360 #
B8565121 ..... N86-18076 #
B8565123 ..... N86-18077 #
B8565729 ..... N86-18078 #
B8566260 ..... N86-17334 #
B8566269 ..... N86-18252 #

B8566383 ..... N86-17923 #
B8566780 ..... N86-18163 #
B8567078 ..... N86-18086 #
B8567079 ..... N86-18087 #
B8567080 ..... N86-18088 #
B8567081 ..... N86-17696 #
B8567082 ..... N86-18089 #
B8567083 ..... N86-18090 #
B8567084 ..... N86-18091 #
B8567086 ..... N86-18092 #
B8567087 ..... N86-18033 #
B8567088 ..... N86-18093 #
B8567089 ..... N86-18034 #
B8567090 ..... N86-18251 #
B8567091 ..... N86-18036 #
B8567092 ..... N86-18035 #
B8567093 ..... N86-18037 #
B8567094 ..... N86-18094 #
B8568087 ..... N86-17695 #
B8568089 ..... N86-17379 #
B8568090 ..... N86-18030 #
B8568096 ..... N86-18031 #
B8568097 ..... N86-18084 #
B8568098 ..... N86-17352 #
B8568102 ..... N86-17343 #
B8568103 ..... N86-18256 #
B8568106 ..... N86-18056 #
B8568107 ..... N86-17325 #
B8568108 ..... N86-18085 #
B8568391 ..... N86-17347 #
B8568392 ..... N86-17699 #
B8568393 ..... N86-17962 #
B8568394 ..... N86-17354 #
B8568395 ..... N86-18042 #
B8568522 ..... N86-17342 #
B8568524 ..... N86-17774 #
B8568525 ..... N86-17311 #
B8568526 ..... N86-18032 #
B8568527 ..... N86-17312 #
B8568528 ..... N86-17775 #
B8568529 ..... N86-17348 #
B8568530 ..... N86-17808 #
B8569022 ..... N86-17335 #
B8569023 ..... N86-17346 #
B8569024 ..... N86-17322 #
B8569025 ..... N86-17700 #
B8569026 ..... N86-17321 #
B8569027 ..... N86-17320 #
B8569030 ..... N86-18205 #
B8569032 ..... N86-17376 #
B8569320 ..... N86-17323 #
B8569323 ..... N86-17809 #
B8569324 ..... N86-17349 #

CE-TRANS-8042 ..... N86-17499

CEAT-NT-15/M/85 ..... N86-17521 #

CETIM-N-01270 ..... N86-17587 #

CETIM-5-650-06 ..... N86-17574 #
CETIM-13-K-301 ..... N86-17557 #
CETIM-13-N-243 ..... N86-17767 #
CETIM-13-N-283 ..... N86-17812 #
CETIM-15-C-251 ..... N86-17691 #
CETIM-100-840 ..... N86-17560 #
CETIM-100340 ..... N86-17575 #
CETIM-100560 ..... N86-17761 #
CETIM-101370 ..... N86-17576 #
CETIM-102360 ..... N86-17762 #

CFD/84/8-PT-2 ..... N86-17686 #
CFD/85/4 ..... N86-17687* #
CFD/85/6 ..... N86-17688 #

CISE-2604 ..... N86-17799 #
CISE-2694 ..... N86-17914 #

CNES-NT-115 ..... N86-17800 #

CONF-841210-25 ..... N86-17538 #
CONF-841231-13 ..... N86-17874 #
CONF-850162-3 ..... N86-18155 #
CONF-850179-1 ..... N86-18150 #
CONF-850252 ..... N86-17875 #
CONF-850289-1 ..... N86-17794 #
CONF-850504-243 ..... N86-17735 #
CONF-850504-260 ..... N86-18191 #
CONF-850504-263 ..... N86-18168 #
CONF-850504-266 ..... N86-18166 #
CONF-850504-270 ..... N86-18167 #
CONF-850504-284 ..... N86-18157 #
CONF-850507-54 ..... N86-18149 #
CONF-850604-17 ..... N86-17877 #
CONF-850605-5 ..... N86-18235 #
CONF-850610-43 ..... N86-17570 #
CONF-850612-9 ..... N86-17906 #
CONF-850616-68 ..... N86-17734 #
CONF-850670-22 ..... N86-17795 #
CONF-850716-4 ..... N86-18145 #
CONF-850721-3 ..... N86-18147 #
CONF-850734-1 ..... N86-17627 #
CONF-850734-2 ..... N86-17714 #
CONF-850758-2 ..... N86-17669 #
CONF-850765-13 ..... N86-18019 #
CONF-850770-8 ..... N86-17536 #
CONF-850783-2 ..... N86-17878 #
CONF-850785-3 ..... N86-18140 #
CONF-850789-1 ..... N86-18214 #
CONF-850791-1 ..... N86-17546 #
CONF-850794-1 ..... N86-18126 #
CONF-850795-5 ..... N86-18170 #
CONF-850807-7 ..... N86-18148 #
CONF-850808-24 ..... N86-17884 #
CONF-850809-79 ..... N86-18195 #
CONF-850810-26 ..... N86-17673 #
CONF-850810-27 ..... N86-17674 #
CONF-850813-3 ..... N86-18144 #
CONF-850813-4 ..... N86-17715 #
CONF-850814-5 ..... N86-17583 #
CONF-850814-7 ..... N86-17712 #
CONF-850814-9 ..... N86-17584 #
CONF-850819-6 ..... N86-18146 #
CONF-850869-1 ..... N86-18146 #
CONF-850870-3 ..... N86-18231 #
CONF-850870-4 ..... N86-18226 #
CONF-850871-5 ..... N86-17539 #
CONF-850871-10 ..... N86-18223 #
CONF-850871-11 ..... N86-18222 #
CONF-850871-14 ..... N86-18232 #
CONF-850871-16 ..... N86-18230 #
CONF-850883-9 ..... N86-18278 #
CONF-850887-17 ..... N86-17737 #
CONF-850887-19 ..... N86-17624 #
CONF-850887-20 ..... N86-17707 #
CONF-850887-28 ..... N86-17582 #
CONF-850887-29 ..... N86-18183 #
CONF-850887-30 ..... N86-18186 #
CONF-850887-31 ..... N86-18182 #
CONF-850887-35 ..... N86-18185 #
CONF-850890-16 ..... N86-18229 #
CONF-850890-17 ..... N86-18224 #
CONF-850903-2 ..... N86-18052 #
CONF-850903-17 ..... N86-18247 #
CONF-850942-19 ..... N86-18141 #
CONF-850942-24 ..... N86-18142 #
CONF-850942-26 ..... N86-18281 #
CONF-850944-1 ..... N86-17912 #
CONF-850986-1 ..... N86-18194 #
CONF-851028-2 ..... N86-17913 #
CONF-851030-6 ..... N86-17677 #
CONF-851045-2 ..... N86-17515 #
CONF-851071-1 ..... N86-17623 #
CONF-851124-2 ..... N86-18111 #
CONF-851125-5 ..... N86-17757 #
CONF-851125-8 ..... N86-18025 #
CONF-851125-9 ..... N86-17676 #
CONF-851140-1 ..... N86-17798 #
CONF-851158-2 ..... N86-17573 #
CONF-851162-2 ..... N86-17772 #
CONF-851163-2 ..... N86-18049 #
CONF-851164-1 ..... N86-18024 #
CONF-851174-1 ..... N86-18152 #
CONF-851174-2 ..... N86-17547 #
CONF-851174-3 ..... N86-17517 #
CONF-860406-1 ..... N86-17508 #
CONF-8405155-8 ..... N86-18165 #
CONF-8409263-1 ..... N86-17505 #
CONF-8411198-1 ..... N86-18212 #
CONF-8503172-1 ..... N86-18026 #
CONF-8503175-1 ..... N86-18143 #
CONF-8504130-3 ..... N86-17511 #
CONF-8504135-3 ..... N86-17909 #
CONF-8504150-3 ..... N86-17672 #
CONF-8504152-8 ..... N86-18154 #
CONF-8504153-2 ..... N86-18213 #
CONF-8504174-1 ..... N86-17670 #
CONF-8504177-1 ..... N86-18001 #
CONF-8505112-2 ..... N86-17516 #
CONF-8505149-2 ..... N86-17910 #
CONF-8505172-3 ..... N86-18138 #
CONF-8505189-2 ..... N86-18137 #
CONF-8505193-1 ..... N86-18234 #
CONF-8506118-4 ..... N86-17507 #
CONF-8506125-9 ..... N86-18220 #
CONF-8506125-10 ..... N86-17543 #
CONF-8506136-2 ..... N86-17905 #
CONF-8506162-2 ..... N86-18153 #
CONF-8506165-3 ..... N86-17548 #
CONF-8506189-1 ..... N86-17742 #
CONF-8508102-1 ..... N86-18181 #
CONF-8508107-1 ..... N86-17540 #
CONF-8508115-1 ..... N86-18069 #
CONF-8508117-1 ..... N86-18139 #
CONF-8508121-1 ..... N86-18192 #
CONF-8509108-1 ..... N86-17907 #
CONF-8509108-2 ..... N86-17908 #
CONF-8509127-3 ..... N86-18200 #
CONF-8509132-1 ..... N86-17750 #
CONF-8509133-2 ..... N86-17537 #
CONF-8509136-1 ..... N86-17751 #
CONF-8509142-2 ..... N86-17882 #
CONF-8509147-8 ..... N86-18225 #
CONF-8509148-2 ..... N86-18156 #
CONF-8509149-1 ..... N86-18053 #
CONF-8509150-1 ..... N86-17738 #
CONF-8509156-1 ..... N86-17990 #
CONF-8509156-2 ..... N86-17989 #
CONF-8509161-2 ..... N86-17935 #
CONF-8509164-1 ..... N86-18221 #
CONF-8509165-2 ..... N86-17544 #
CONF-8510156-1 ..... N86-17797 #
CONF-8510157-1 ..... N86-17979 #

CPIA-PUBL-425 ..... N86-17380

CS-1985-9 ..... N86-18016 #

CTH-MATH-1985-03 ..... N86-18062 #

CWI-AM-R8502 ..... N86-18078 #

CWI-CS-R8503 ..... N86-18092 #
CWI-CS-R8504 ..... N86-18033 #
CWI-CS-R8505 ..... N86-18093 #
CWI-CS-R8506 ..... N86-18034 #
CWI-CS-R8507 ..... N86-18251 #
CWI-CS-R8508 ..... N86-18036 #
CWI-CS-R8509 ..... N86-18035 #
CWI-CS-R8510 ..... N86-18037 #
CWI-CS-R8511 ..... N86-18094 #

CWI-NM-R8502 ..... N86-18086 #
CWI-NM-R8503 ..... N86-18087 #
CWI-NM-R8504 ..... N86-18088 #
CWI-NM-R8505 ..... N86-17696 #
CWI-NM-R8506 ..... N86-18089 #
CWI-NM-R8509 ..... N86-18090 #
CWI-NM-R8510 ..... N86-18091 #

CWI-PM-R8415 ..... N86-18076 #
CWI-PM-R8502 ..... N86-18077 #

D-82 ..... N86-17553 #

DE84-017165 ..... N86-18244 #
DE85-002938 ..... N86-17875 #
DE85-002950 ..... N86-17876 #
DE85-005242 ..... N86-17874 #
DE85-006504 ..... N86-17752 #
DE85-006881 ..... N86-18212 #
DE85-007937 ..... N86-18052 #
DE85-008814 ..... N86-17578 #
DE85-009931 ..... N86-18068 #
DE85-010073 ..... N86-17506 #
DE85-011165 ..... N86-17798 #
DE85-011495 ..... N86-17757 #
DE85-011517 ..... N86-17538 #
DE85-012000 ..... N86-18169 #
DE85-012163 ..... N86-17877 #
DE85-012933 ..... N86-17706 #
DE85-013220 ..... N86-18165 #
DE85-013874 ..... N86-17623 #
DE85-014112 ..... N86-17734 #
DE85-015173 ..... N86-17794 #
DE85-015536 ..... N86-17537 #
DE85-015570 ..... N86-18024 #
DE85-015693 ..... N86-18019 #
DE85-015704 ..... N86-17737 #
DE85-015760 ..... N86-17750 #
DE85-016067 ..... N86-17736 #
DE85-016173 ..... N86-17675 #
DE85-016253 ..... N86-18188 #
DE85-016287 ..... N86-18025 #
DE85-016357 ..... N86-17669 #
DE85-016364 ..... N86-17670 #
DE85-016372 ..... N86-18137 #
DE85-016410 ..... N86-17906 #
DE85-016441 ..... N86-17507 #
DE85-016451 ..... N86-17873 #
DE85-016458 ..... N86-17751 #
DE85-016479 ..... N86-17539 #
DE85-016482 ..... N86-18234 #
DE85-016542 ..... N86-17878 #
DE85-016553 ..... N86-18191 #
DE85-016569 ..... N86-17735 #
DE85-016578 ..... N86-17508 #
DE85-016583 ..... N86-17676 #

DE85-016594 ..... N86-17570 #
DE85-016605 ..... N86-17540 #
DE85-016630 ..... N86-18138 #
DE85-016649 ..... N86-17571 #
DE85-016736 ..... N86-18254 #
DE85-016787 ..... N86-18181 #
DE85-016853 ..... N86-17541 #
DE85-016860 ..... N86-17677 #
DE85-016922 ..... N86-17624 #
DE85-016946 ..... N86-17707 #
DE85-016953 ..... N86-17879 #
DE85-016974 ..... N86-18227 #
DE85-017070 ..... N86-18069 #
DE85-017094 ..... N86-17505 #
DE85-017160 ..... N86-18211 #
DE85-017184 ..... N86-17772 #
DE85-017189 ..... N86-18199 #
DE85-017243 ..... N86-18151 #
DE85-017279 ..... N86-18152 #
DE85-017349 ..... N86-18192 #
DE85-017397 ..... N86-17515 #
DE85-017440 ..... N86-18166 #
DE85-017441 ..... N86-18167 #
DE85-017444 ..... N86-18168 #
DE85-017480 ..... N86-17509 #
DE85-017508 ..... N86-18153 #
DE85-017509 ..... N86-18213 #
DE85-017512 ..... N86-18154 #
DE85-017521 ..... N86-17582 #
DE85-017527 ..... N86-18139 #
DE85-017531 ..... N86-18155 #
DE85-017533 ..... N86-17536 #
DE85-017535 ..... N86-18182 #
DE85-017536 ..... N86-18186 #
DE85-017541 ..... N86-17583 #
DE85-017554 ..... N86-17738 #
DE85-017558 ..... N86-18214 #
DE85-017559 ..... N86-18183 #
DE85-017565 ..... N86-18053 #
DE85-017579 ..... N86-18001 #
DE85-017584 ..... N86-17742 #
DE85-017616 ..... N86-18193 #
DE85-017617 ..... N86-17599 #
DE85-017634 ..... N86-18020 #
DE85-017636 ..... N86-18194 #
DE85-017679 ..... N86-18200 #
DE85-017713 ..... N86-17990 #
DE85-017720 ..... N86-17989 #
DE85-017723 ..... N86-17978 #
DE85-017724 ..... N86-17880 #
DE85-017726 ..... N86-17739 #
DE85-017729 ..... N86-18215 #
DE85-017733 ..... N86-18216 #
DE85-017735 ..... N86-17671 #
DE85-017736 ..... N86-18217 #
DE85-017740 ..... N86-17630 #
DE85-017743 ..... N86-17881 #
DE85-017753 ..... N86-18218 #
DE85-017757 ..... N86-17708 #
DE85-017769 ..... N86-17753 #
DE85-017782 ..... N86-17709 #
DE85-017783 ..... N86-18184 #
DE85-017789 ..... N86-17740 #
DE85-017790 ..... N86-17754 #
DE85-017792 ..... N86-17710 #
DE85-017797 ..... N86-17711 #
DE85-017803 ..... N86-17741 #
DE85-017804 ..... N86-18219 #
DE85-017805 ..... N86-17625 #
DE85-017814 ..... N86-17882 #
DE85-017815 ..... N86-18195 #
DE85-017818 ..... N86-17510 #
DE85-017830 ..... N86-17672 #
DE85-017833 ..... N86-18185 #
DE85-017836 ..... N86-18220 #
DE85-017837 ..... N86-17511 #
DE85-017847 ..... N86-17712 #
DE85-017850 ..... N86-17516 #
DE85-017851 ..... N86-17584 #
DE85-017864 ..... N86-17910 #
DE85-017875 ..... N86-17956 #
DE85-017876 ..... N86-18021 #
DE85-017881 ..... N86-18114 #
DE85-017896 ..... N86-17546 #
DE85-017910 ..... N86-17907 #
DE85-017918 ..... N86-18141 #
DE85-017953 ..... N86-17713 #
DE85-018011 ..... N86-18196 #
DE85-018027 ..... N86-18197 #
DE85-018032 ..... N86-17883* #
DE85-018074 ..... N86-18142 #
DE85-018078 ..... N86-17572 #
DE85-018079 ..... N86-18198 #
DE85-018082 ..... N86-18189 #
DE85-018101 ..... N86-17884 #
DE85-018106 ..... N86-17547 #
DE85-018110 ..... N86-18140 #
DE85-018113 ..... N86-18070 #
DE85-018120 ..... N86-17911 #
DE85-018121 ..... N86-18002 #
DE85-018125 ..... N86-18022 #
DE85-018126 ..... N86-17885 #
DE85-018136 ..... N86-17626 #
DE85-018138 ..... N86-17542 #
DE85-018139 ..... N86-18190 #
DE85-018140 ..... N86-17585 #
DE85-018152 ..... N86-17755 #
DE85-018153 ..... N86-18245 #
DE85-018154 ..... N86-17756 #
DE85-018155 ..... N86-18023 #
DE85-018156 ..... N86-17957 #
DE85-018161 ..... N86-18246 #
DE85-018177 ..... N86-17886 #
DE85-018182 ..... N86-18049 #
DE85-018183 ..... N86-18156 #
DE85-018188 ..... N86-18281 #
DE85-018201 ..... N86-17627 #
DE85-018202 ..... N86-17714 #
DE85-018208 ..... N86-18026 #
DE85-018215 ..... N86-17908 #
DE85-018220 ..... N86-17935 #
DE85-018224 ..... N86-17548 #
DE85-018272 ..... N86-18221 #
DE85-018273 ..... N86-17797 #
DE85-018293 ..... N86-18228 #
DE85-018296 ..... N86-17512 #
DE85-018339 ..... N86-18229 #
DE85-018341 ..... N86-18278 #
DE85-018346 ..... N86-17573 #
DE85-018348 ..... N86-18247 #
DE85-018349 ..... N86-17979 #
DE85-018354 ..... N86-18143 #
DE85-018355 ..... N86-17912 #
DE85-018361 ..... N86-18222 #
DE85-018362 ..... N86-18223 #
DE85-018363 ..... N86-18144 #
DE85-018367 ..... N86-17543 #
DE85-018371 ..... N86-18230 #
DE85-018374 ..... N86-17544 #
DE85-018375 ..... N86-17909 #
DE85-018377 ..... N86-17673 #
DE85-018379 ..... N86-17674 #
DE85-018382 ..... N86-18235 #
DE85-018384 ..... N86-18126 #
DE85-018387 ..... N86-18170 #
DE85-018388 ..... N86-17517 #
DE85-018389 ..... N86-18231 #
DE85-018391 ..... N86-18145 #
DE85-018392 ..... N86-17913 #
DE85-018398 ..... N86-18224 #
DE85-018406 ..... N86-18225 #
DE85-018408 ..... N86-18146 #
DE85-018409 ..... N86-18226 #
DE85-018410 ..... N86-18147 #
DE85-018430 ..... N86-17513 #
DE85-018450 ..... N86-18232 #
DE85-018451 ..... N86-17715 #
DE85-018454 ..... N86-18148 #
DE85-018550 ..... N86-18236 #
DE86-000013 ..... N86-17628 #
DE86-000016 ..... N86-18157 #
DE86-000019 ..... N86-18115 #
DE86-000020 ..... N86-18149 #
DE86-000047 ..... N86-18071 #
DE86-000048 ..... N86-17310 #
DE86-000054 ..... N86-18150 #
DE86-000184 ..... N86-17549 #
DE86-000220 ..... N86-17514 #
DE86-000237 ..... N86-18238 #
DE86-000238 ..... N86-18201 #
DE86-000239 ..... N86-18202 #
DE86-000257 ..... N86-17479 #
DE86-000406 ..... N86-17936 #
DE86-000408 ..... N86-17937 #
DE86-000416 ..... N86-17822 #
DE86-000418 ..... N86-17938 #
DE86-000419 ..... N86-17939 #
DE86-000520 ..... N86-17629 #
DE86-000521 ..... N86-17545 #
DE86-001147 ..... N86-17940 #
DE86-001258 ..... N86-18158 #
DE86-001329 ..... N86-18237 #
DE86-001332 ..... N86-18116 #

DFVLR-FB-85-33 ..... N86-17945 #

DFVLR-MITT-85-10 ..... N86-17333 #
DFVLR-MITT-85-11 ..... N86-17607 #

DFVLR-WE2/9143 ..... N86-17370* #

DGT-25.919 ..... N86-17552 #
DGT-26.649 ..... N86-17485 #
DGT-26.749 ..... N86-17484 #
DGT-26.817 ..... N86-17486 #
DGT-27.039 ..... N86-17487 #

DMI-GEOPHYS-PAPERS-B-72 ..... N86-18283 #

DMI-GEOPHYS-PAPERS-R-71 ..... N86-17727 #

DOE/CE-T13 ..... N86-17876 #

DOE/CE-0152 ..... N86-17886 #
DOE/CE-40545/9 ..... N86-17509 #

DOE/CH-6(3)-FINAL ..... N86-17822 #
DOE/CH-7(1)-FINAL ..... N86-17936 #
DOE/CH-7(2)-FINAL ..... N86-17937 #
DOE/CH-7(3)-FINAL ..... N86-17938 #
DOE/CH-8(2)-FINAL ..... N86-17939 #
DOE/CH-40125/3 ..... N86-18169 #

DOE/DP-40124/74 ..... N86-17742 #

DOE/ER-02296/30 ..... N86-17549 #
DOE/ER-05490/63 ..... N86-18116 #
DOE/ER-05490/66 ..... N86-18237 #
DOE/ER-10890/T1 ..... N86-18227 #
DOE/ER-13026/T2 ..... N86-17879 #
DOE/ER-13300/T1 ..... N86-17514 #
DOE/ER-45139/2 ..... N86-18228 #
DOE/ER-53170/T2 ..... N86-18197 #
DOE/ER-53192/1 ..... N86-18199 #

DOE/ET-20110/5-REV ..... N86-17675 #
DOE/ET-51013/154 ..... N86-18192 #
DOE/ET-53088/195 ..... N86-18151 #
DOE/ET-53088/204 ..... N86-18238 #
DOE/ET-53088/206 ..... N86-18201 #
DOE/ET-53088/207 ..... N86-18202 #
DOE/ET-53193/1-274 ..... N86-18196 #

DOE/FE-60339/T20 ..... N86-17513 #

DOE/LC-10845/1828 ..... N86-17506 #

DOE/NASA/0363-1 ..... N86-17531* #

DOE/NBM-5018032 ..... N86-17883* #

DOE/R4-10501/T1 ..... N86-18254 #

DOE/TIC-4608-REV-1 ..... N86-18244 #

DOT/FAA-AM-85-6 ..... N86-17982 #

DRI-2-85 ..... N86-17946 #

E-2706 ..... N86-17839* #
E-2820 ..... N86-17472* #
E-2848 ..... N86-17368* #
E-2856 ..... N86-17595* #
E-2860 ..... N86-17477* #

EGG-10282-1087 ..... N86-18181 #

ENST-84D004 ..... N86-18027 #
ENST-85C002 ..... N86-18074 #
ENST-85C004 ..... N86-18096 #
ENST-85D002 ..... N86-17611 #
ENST-85E001 ..... N86-18248 #
ENST-85E002 ..... N86-17600 #
ENST-85E007 ..... N86-17369 #

EOTR-85-6 ..... N86-17705 #

EPA-600/D-85-195 ..... N86-17984 #
EPA-600/3-85-055 ..... N86-17963 #
EPA-600/3-85-063 ..... N86-17927 #
EPA-600/8-85-001 ..... N86-17926 #

ER-83/07 ..... N86-18095 #

ESA-BR-24 ..... N86-18282 #

ESA-CR(P)-1512 ..... N86-17601 #
ESA-CR(P)-2039 ..... N86-17716 #
ESA-CR(P)-2059 ..... N86-17632 #
ESA-CR(P)-2061 ..... N86-17378 #
ESA-CR(P)-2066-VOL-1 ..... N86-17365 #
ESA-CR(P)-2066-VOL-2 ..... N86-17366 #
ESA-CR(P)-2067-VOL-1 ..... N86-17825 #
ESA-CR(P)-2067-VOL-2 ..... N86-17826 #
ESA-CR(P)-2069 ..... N86-17718 #
ESA-CR(P)-2073 ..... N86-18028 #
ESA-CR(P)-2075 ..... N86-18029 #
ESA-CR(P)-2078 ..... N86-17470 #

ESA-CR(P)-2081 N86-17364 #
ESA-CR(P)-2082 N86-17633 #
ESA-CR(P)-2083 N86-17362 #
ESA-CR(P)-2084 N86-17823 #
ESA-CR(P)-2085 N86-17363 #
ESA-CR(P)-2086 N86-17802 #
ESA-CR(P)-2087 N86-17374 #
ESA-CR(P)-2089 N86-17332 #

ESA-PSS-01-603 N86-17634 #
ESA-PSS-01-709-ISSUE-1 N86-17375 #
ESA-PSS-01-720-ISSUE-1 N86-17554 #

ESA-SP-230 N86-17432 #
ESA-SP-1074 N86-17972 #

ESA-STR-214 N86-18280 #
ESA-STR-215 N86-18082 #

ESDU-84002 N86-17357
ESDU-84005 N86-17305
ESDU-84009 N86-18058
ESDU-84011-A N86-17949
ESDU-84013 N86-17663
ESDU-84016 N86-17664

ETH-7696 N86-17782

EUR-9385-EN N86-17897 #
EUR-9607-D N86-17694 #

EVT-852 N86-17632 #

E86-10019 N86-17814* #
E86-10021 N86-17815* #
E86-10022 N86-17816* #
E86-10024 N86-17817* #

FDO-TPV-84-014 N86-18205 #

FFA-TN-1982-24 N86-17316 #
FFA-TN-1985-10 N86-17317 #
FFA-TN-1985-11 N86-17318 #

FI-44-TBR-96 N86-17608 #
FI-445-TBR-23 N86-17602 #

FNAL-TM-1325 N86-18168 #
FNAL-TM-1326 N86-18167 #
FNAL-TM-1327 N86-18166 #

FNAL/C-85-100-A N86-18165 #

FOA-A-40051-B4 N86-17579 #

FOA-C-10212-M4 N86-18041 #
FOA-C-20577-D4 N86-17725 #
FOA-C-20580-D1 N86-17581 #
FOA-C-30390-E2 N86-17604 #
FOA-C-30391-E1,E3 N86-17631 #
FOA-C-30394-E1 N86-17719 #
FOA-C-30397-E2 N86-17612 #
FOA-C-30398-A3 N86-17605 #
FOA-C-30399-A3 N86-17606 #
FOA-C-30402-E N86-17613 #
FOA-C-30407-E N86-17638 #
FOA-C-40216-C2 N86-17995 #
FOA-C-50007-H2 N86-17824 #

FOA-E-40020 N86-17944 #

FRCR-274 N86-18196 #

GA-A-18122 N86-18200 #

GAO/RCED-85-78 N86-17964 #

GEC-16,879C N86-17718 #

GPO-44-770 N86-17367 #
GPO-46-870 N86-17324 #

GTFR-59 N86-18193 #
GTFR-60 N86-17599 #

HEDL-SA-3268-FP N86-18026 #

IABG-TF-1425-PT-1 N86-17336
IABG-TF-1425-PT-2 N86-17337

ICAF-1442-PT-1 N86-17336
ICAF-1442-PT-2 N86-17337

ICASE-85-54 N86-17997* #

ICRM-S-14 N86-18134

IFSR-204 N86-18238 #
IFSR-206 N86-18201 #
IFSR-207 N86-18202 #

IITRI-M06136-9 N86-17531* #

IL/SGS/EGN-110 N86-17948 #

ILR-MITT-142 N86-18171 #

INPE-3564-PRE/770 N86-17371 #
INPE-3635-PRE/812 N86-17814* #

IR-4 N86-17748* #

IS-M-541 N86-17537 #

IS-17-323 N86-17560 #

ISBN-0-309-03812-X N86-17770 #
ISBN-0-85679-463-5 N86-17357
ISBN-0-85679-467-8 N86-17305
ISBN-0-85679-471-6 N86-18058
ISBN-0-85679-473-2 N86-17949
ISBN-0-85679-475-9 N86-17663
ISBN-0-85679-478-3 N86-17664
ISBN-3-87977-056-5-PT-1 N86-17326 #
ISBN-3-87977-056-5-PT-2 N86-17327 #
ISBN-82-7224-091-2 N86-17361 #
ISBN-87-7478-253-3 N86-17727 #
ISBN-87-7478-254-2 N86-18283 #
ISBN-90-353-0019-X N86-17636 #
ISBN-90-353-0022-X N86-17360 #
ISBN-90-355-0021-6 N86-17924 #
ISBN-90-6818-014-2 N86-18047
ISBN-90-6818-015-0 N86-18048
ISBN-90-6818-017-7 N86-18007
ISBN-92-63-10636-3 N86-18003 #
ISBN-92-63-10639-8 N86-17958 #
ISBN-92-63-10644-4 N86-17959 #
ISBN-951-38-2384-9 N86-17698 #
ISBN-951-753-436-1 N86-18073 #
ISBN-951-753-454-X N86-18258 #

ISL-R-110/84 N86-17518 #

ISSN-0078-379X N86-17683 #
ISSN-0078-379X N86-17684 #
ISSN-0078-379X N86-18127 #
ISSN-0078-3781 N86-17960 #
ISSN-0078-3781 N86-18128 #
ISSN-0109-6605 N86-17946 #
ISSN-0141-397X N86-17357
ISSN-0141-3988 N86-18058
ISSN-0141-4003 N86-17949
ISSN-0141-4011 N86-17663
ISSN-0141-4054 N86-17305
ISSN-0142-7135 N86-18134
ISSN-0143-7135 N86-18135
ISSN-0143-7135 N86-18136
ISSN-0144-402X N86-17664
ISSN-0167-8590 N86-17360 #
ISSN-0167-8590 N86-17636 #
ISSN-0167-8590 N86-17924 #
ISSN-0169-1708 N86-17743 #
ISSN-0170-1339 N86-17353 #
ISSN-0171-1342 N86-17945 #
ISSN-0176-7739 N86-17333 #
ISSN-0176-7739 N86-17607 #
ISSN-0178-0719 N86-17721 #
ISSN-0250-1589 N86-18282 #
ISSN-0262-5369 N86-17593
ISSN-0262-5369 N86-18006
ISSN-0262-5369 N86-18044
ISSN-0262-5369 N86-18045
ISSN-0262-5369 N86-18046
ISSN-0262-5369 N86-18051
ISSN-0281-0220 N86-17579 #
ISSN-0281-0247 N86-18041 #
ISSN-0289-260X N86-17267 #
ISSN-0303-4003 N86-17694 #
ISSN-0309-3050 N86-17701
ISSN-0340-7608 N86-17483 #
ISSN-0340-7608 N86-17558 #
ISSN-0340-7608 N86-17559 #
ISSN-0340-7608 N86-17577 #
ISSN-0340-7608 N86-17635 #
ISSN-0340-7608 N86-17720 #
ISSN-0340-7608 N86-17763 #
ISSN-0340-7608 N86-17773 #
ISSN-0340-7608 N86-17803 #
ISSN-0340-7608 N86-17887 #
ISSN-0340-7608 N86-17891 #
ISSN-0340-7608 N86-17892 #
ISSN-0340-7608 N86-17893 #
ISSN-0340-7608 N86-18117 #

ISSN-0341-6739 N86-17519 #
ISSN-0341-7964 N86-17592
ISSN-0347-2124 N86-17995 #
ISSN-0347-2809 N86-18062 #
ISSN-0347-3694 N86-17581 #
ISSN-0347-3694 N86-17725 #
ISSN-0347-3708 N86-17604 #
ISSN-0347-3708 N86-17605 #
ISSN-0347-3708 N86-17606 #
ISSN-0347-3708 N86-17612 #
ISSN-0347-3708 N86-17613 #
ISSN-0347-3708 N86-17631 #
ISSN-0347-3708 N86-17638 #
ISSN-0347-3708 N86-17719 #
ISSN-0347-7665 N86-17824 #
ISSN-0349-2656 N86-17377 #
ISSN-0349-2656 N86-17941 #
ISSN-0349-2656 N86-17942 #
ISSN-0349-2656 N86-17943 #
ISSN-0349-2699 N86-18203 #
ISSN-0355-5712 N86-18258 #
ISSN-0358-5077 N86-17698 #
ISSN-0366-0885 N86-17553 #
ISSN-0374-1257 N86-18130 #
ISSN-0379-4059 N86-17375 #
ISSN-0379-4059 N86-17554 #
ISSN-0379-4059 N86-17634 #
ISSN-0379-4067 N86-18082 #
ISSN-0379-4067 N86-18280 #
ISSN-0379-6566 N86-17432 #
ISSN-0389-4010 N86-17308 #
ISSN-0436-1199 N86-17520 #
ISSN-0436-1199 N86-18160 #
ISSN-0436-1199 N86-18161 #
ISSN-0436-1199 N86-18162 #
ISSN-0469-4244 N86-17818 #
ISSN-0724-3316 N86-17760 #
ISSN-0751-1337 N86-18074 #
ISSN-0751-1337 N86-18096 #
ISSN-0751-1345 N86-17611 #
ISSN-0751-1345 N86-18027 #
ISSN-0751-1353 N86-17369 #
ISSN-0751-1353 N86-17600 #
ISSN-0751-1353 N86-18248 #
ISSN-0781-6480 N86-18073 #

ISVR-TR-128 N86-17717 #

ITS-TR-011/85 N86-17374 #

IZF-1984-22 N86-18187 #
IZF-1984-36 N86-17986 #
IZF-1985-7 N86-18131 #
IZF-1985-9 N86-17992 #
IZF-1985-10 N86-17993 #
IZF-1985-11 N86-17994 #
IZF-1985-14 N86-17610 #
IZF-1985-15 N86-17723 #

JPRS-UEE-84-016 N86-17640 #

JUEL-1975 N86-17553 #

KFK-3877 N86-17694 #

KGI-PREPRINT-073 N86-17941 #
KGI-PREPRINT-076 N86-17942 #
KGI-PREPRINT-077 N86-17377 #
KGI-PREPRINT-079 N86-17943 #

KIS-1985-2E N86-17568 #
KIS-1985-3E N86-17532 #

KNMI-TR-66 N86-17923 #
KNMI-TR-67 N86-17743 #

KY/TR-85-1 N86-17512 #

L-16045 N86-18060* #

LA-TR-85-47 N86-18158 #

LA-UR-85-2077 N86-17734 #
LA-UR-85-2485 N86-17737 #
LA-UR-85-2565 N86-18019 #
LA-UR-85-2838 N86-18053 #
LA-UR-85-2863 N86-18183 #
LA-UR-85-2881 N86-18214 #
LA-UR-85-2902 N86-17738 #
LA-UR-85-2987 N86-17583 #
LA-UR-85-3021 N86-18186 #
LA-UR-85-3022 N86-18182 #
LA-UR-85-3026 N86-17536 #
LA-UR-85-3054 N86-18155 #
LA-UR-85-3094 N86-18139 #

LA-10494-MS ..... N86-17713 #

LAB-REPT-739 ..... N86-17793 #
LAB-REPT-757 ..... N86-18113 #
LAB-REPT-758 ..... N86-17790 #
LAB-REPT-759 ..... N86-17810 #
LAB-REPT-761 ..... N86-17811 #

LBF-FB-167-PT-1 ..... N86-17336
LBF-FB-167-PT-2 ..... N86-17337

LBL-18631 ..... N86-17798 #
LBL-19200 ..... N86-18068 #
LBL-19369 ..... N86-17538 #
LBL-19488 ..... N86-17735 #
LBL-19602 ..... N86-18191 #
LBL-19806 ..... N86-18138 #

LC-85-11564 ..... N86-17770 #

LIDS-R-1485 ..... N86-18103 #

LIDS-TH-1440 ..... N86-18100 #

LPTHE-84/36 ..... N86-18241 #

MATH-REPT-84-133 ..... N86-18064 #

MBB-UA-876/85 ..... N86-17827 #

MBB-Z-46/48 ..... N86-17482 #

MBL-1985-6 ..... N86-17980 #

MDLK-R-8337 ..... N86-17829 #
MDLK-R-8429 ..... N86-17828 #
MDLK-R-8509 ..... N86-17722 #

MEAH-54 ..... N86-18097 #

MIT/BNL-84-3 ..... N86-17545 #

MPE-192 ..... N86-17721 #

MPIS-MITT-80 ..... N86-18130 #

MPIS-4/1985 ..... N86-17520 #
MPIS-5/1985 ..... N86-18160 #
MPIS-6/1985 ..... N86-18161 #
MPIS-7/1985 ..... N86-18162 #

M2-666500 ..... N86-17556 #
M3-450900 ..... N86-17555 #
M5/7-14 ..... N86-17363 #

NADC-85074-60 ..... N86-17975 #

NAE-AN-33 ..... N86-17530 #

NAL-SP-3 ..... N86-17267 #

NAL-TR-856 ..... N86-17308 #

NAS 1.15:77976 ..... N86-17338* #
NAS 1.15:77997 ..... N86-17370* #
NAS 1.15:86233 ..... N86-17817* #
NAS 1.15:86851 ..... N86-18277* #
NAS 1.15:87192 ..... N86-17368* #
NAS 1.15:87201 ..... N86-17595* #
NAS 1.15:87204 ..... N86-17477* #
NAS 1.15:87207 ..... N86-17789* #
NAS 1.15:87219 ..... N86-17472* #
NAS 1.15:87414 ..... N86-18121* #
NAS 1.15:87599 ..... N86-17373* #
NAS 1.26:3953 ..... N86-17359* #
NAS 1.26:166619 ..... N86-17358* #
NAS 1.26:175021 ..... N86-17788* #
NAS 1.26:175027 ..... N86-17531* #
NAS 1.26:175029 ..... N86-17748* #
NAS 1.26:175031 ..... N86-17665* #
NAS 1.26:175861 ..... N86-17816* #
NAS 1.26:175884 ..... N86-17814* #
NAS 1.26:176419 ..... N86-17687* #
NAS 1.26:176435 ..... N86-17815* #
NAS 1.26:176457 ..... N86-17883* #
NAS 1.26:176460 ..... N86-18061* #
NAS 1.26:176464 ..... N86-17731* #
NAS 1.26:176484 ..... N86-17372* #
NAS 1.26:176485 ..... N86-17475* #
NAS 1.26:176486 ..... N86-17998* #
NAS 1.26:176487 ..... N86-17476* #
NAS 1.26:176489 ..... N86-18179* #
NAS 1.26:176490 ..... N86-17594* #
NAS 1.26:176498 ..... N86-17928* #
NAS 1.26:176499 ..... N86-17929* #
NAS 1.26:176500 ..... N86-17930* #
NAS 1.26:176501 ..... N86-17351* #
NAS 1.26:176569 ..... N86-17502* #
NAS 1.26:178023 ..... N86-17997* #
NAS 1.26:178474 ..... N86-17703* #
NAS 1.55:2408 ..... N86-17839* #
NAS 1.60:2536 ..... N86-18060* #

NASA-CP-2408 ..... N86-17839* #

NASA-CR-3953 ..... N86-17359* #
NASA-CR-166619 ..... N86-17358* #
NASA-CR-175021 ..... N86-17788* #
NASA-CR-175027 ..... N86-17531* #
NASA-CR-175029 ..... N86-17748* #
NASA-CR-175031 ..... N86-17665* #
NASA-CR-175861 ..... N86-17816* #
NASA-CR-175884 ..... N86-17814* #
NASA-CR-176419 ..... N86-17687* #
NASA-CR-176435 ..... N86-17815* #
NASA-CR-176457 ..... N86-17883* #
NASA-CR-176460 ..... N86-18061* #
NASA-CR-176464 ..... N86-17731* #
NASA-CR-176484 ..... N86-17372* #
NASA-CR-176485 ..... N86-17475* #
NASA-CR-176486 ..... N86-17998* #
NASA-CR-176487 ..... N86-17476* #
NASA-CR-176489 ..... N86-18179* #
NASA-CR-176490 ..... N86-17594* #
NASA-CR-176498 ..... N86-17928* #
NASA-CR-176499 ..... N86-17929* #
NASA-CR-176500 ..... N86-17930* #
NASA-CR-176501 ..... N86-17351* #
NASA-CR-176569 ..... N86-17502* #
NASA-CR-178023 ..... N86-17997* #
NASA-CR-178474 ..... N86-17703* #

NASA-TM-77976 ..... N86-17338* #
NASA-TM-77997 ..... N86-17370* #
NASA-TM-86233 ..... N86-17817* #
NASA-TM-86851 ..... N86-18277* #
NASA-TM-87192 ..... N86-17368* #
NASA-TM-87201 ..... N86-17595* #
NASA-TM-87204 ..... N86-17477* #
NASA-TM-87207 ..... N86-17789* #
NASA-TM-87219 ..... N86-17472* #
NASA-TM-87414 ..... N86-18121* #
NASA-TM-87599 ..... N86-17373* #

NASA-TP-2536 ..... N86-18060* #

NBS-GCR-85-492 ..... N86-17873 #

NBSIR-85/3020 ..... N86-17769 #
NBSIR-85/3164 ..... N86-18004 #
NBSIR-85/3183 ..... N86-17776 #
NBSIR-85/3248 ..... N86-17501 #

NCAR/TN-254+STR ..... N86-17968 #

NIKHEF-H/85-2 ..... N86-17890 #
NIKHEF-H/85-4 ..... N86-18163 #

NLR-MP-83045-U ..... N86-17809 #
NLR-MP-83057-U ..... N86-18252 #
NLR-MP-84004-U ..... N86-17334 #
NLR-MP-84005-U ..... N86-17342 #
NLR-MP-84009-U ..... N86-17695 #
NLR-MP-84018-U ..... N86-17322 #
NLR-MP-84020-U ..... N86-17379 #
NLR-MP-84032-U ..... N86-18030 #
NLR-MP-84051-U ..... N86-18031 #
NLR-MP-84053-U ..... N86-18205 #
NLR-MP-84054-U ..... N86-18084 #
NLR-MP-84056-U ..... N86-17352 #
NLR-MP-84062-U ..... N86-17343 #
NLR-MP-84063-U ..... N86-18256 #
NLR-MP-84064-U ..... N86-17774 #
NLR-MP-84066-U ..... N86-17323 #
NLR-MP-84069-U ..... N86-17311 #
NLR-MP-84071-U ..... N86-18056 #
NLR-MP-84073-U ..... N86-17325 #
NLR-MP-84074-U ..... N86-17349 #
NLR-MP-84078-U ..... N86-18085 #
NLR-MP-84083-U ..... N86-18032 #

NLR-TR-82034-U ..... N86-17915 #
NLR-TR-82059-U ..... N86-17916 #
NLR-TR-82090-U ..... N86-17917 #
NLR-TR-82111-U ..... N86-17918 #
NLR-TR-82126-U ..... N86-17354 #
NLR-TR-82133-U ..... N86-17962 #
NLR-TR-82135-U ..... N86-17919 #
NLR-TR-83010-U ..... N86-17346 #
NLR-TR-83045-U ..... N86-17920 #
NLR-TR-83054-U ..... N86-17921 #
NLR-TR-83063-U ..... N86-17335 #
NLR-TR-83066-U ..... N86-17808 #
NLR-TR-83091-U ..... N86-17347 #
NLR-TR-83105-U ..... N86-17922 #
NLR-TR-83106-U ..... N86-17376 #
NLR-TR-83123-U ..... N86-17320 #
NLR-TR-83130-U ..... N86-17699 #
NLR-TR-83136-U ..... N86-17321 #
NLR-TR-83149-U ..... N86-18042 #
NLR-TR-84001-U ..... N86-17700 #
NLR-TR-84011-U ..... N86-17775 #
NLR-TR-84030-U ..... N86-17348 #
NLR-TR-84043-U-PT-1 ..... N86-17336
NLR-TR-84043-U-PT-2 ..... N86-17337

NOAA-NWS-WRCP-50 ..... N86-17967 #

NOAA-TM-ERL-WPL-125 ..... N86-17965 #

NOAA-TM-NESDIS-12 ..... N86-17966 #

NORDA-TN-303 ..... N86-17970 #

NORSAR-CONTRIB-354 ..... N86-17933 #

NOSC/TD-820 ..... N86-17821 #
NOSC/TD-822 ..... N86-17999 #

NOTA-1542 ..... N86-17831 #
NOTA-1544 ..... N86-17833 #
NOTA-1580 ..... N86-17832 #

NPL-DITC-54/85 ..... N86-18006
NPL-DITC-55/85 ..... N86-18044
NPL-DITC-56/85 ..... N86-18045
NPL-DITC-59/85 ..... N86-18046
NPL-DITC-62/85 ..... N86-17593
NPL-DITC-65/1985 ..... N86-18051

NPL-MP-84084-U ..... N86-17312 #

NPL-QU-70 ..... N86-17701

NPL-RS(EXT)-79 ..... N86-18135

NPL-RS(EXT)77 ..... N86-18134
NPL-RS(EXT)80 ..... N86-18136

NPRDC-TR-85-36 ..... N86-18013 #

NPS55-85-020 ..... N86-18102 #
NPS55-85-021 ..... N86-17969 #
NPS61-85-002 ..... N86-17955 #

NRC-A-1042 ..... N86-17983 #
NRC-A-1339 ..... N86-18018 #

NRC-FIN-B2001 ..... N86-17905 #

NRC-25075 ..... N86-17530 #

NSF/IST-85001 ..... N86-18253 #

NSMRL-1052 ..... N86-17704 #

NUREG/CR-3537 ..... N86-17983 #
NUREG/CR-3805-VOL-2 ..... N86-17796 #
NUREG/CR-3904 ..... N86-18017 #
NUREG/CR-4122 ..... N86-18018 #
NUREG/CR-4334 ..... N86-17934 #

ONERA-NT-1985-1 ..... N86-17960 #
ONERA-NT-1985-2 ..... N86-18128 #

ONERA-P-1984-1 ..... N86-17683 #
ONERA-P-1984-2 ..... N86-17684 #
ONERA-P-1985-1 ..... N86-18127 #

ONERA-RF-10/7236-PY ..... N86-17639 #

ONERA-RS-10/3466-PY ..... N86-17637 #

ONERA-RSF-27/7077-AY-408 ..... N86-17693 #

ONERA-RT-1/3636-M-PT-1 ..... N86-17488 #
ONERA-RT-3/3567-RY-C40-R ..... N86-17340 #
ONERA-RT-21/3064-RY-045-R ..... N86-17315 #
ONERA-RT-54/1765-RY-044-R ..... N86-17356 #

ONERA-RTS-21/7135-EY ..... N86-17692 #

ORNL-TM-9378 ..... N86-17626 #

ORNL-6151 ..... N86-18070 #
ORNL-6190 ..... N86-18002 #

ORNL/SUB-81-16953/1 ..... N86-17572 #

ORNL/TM-9212 ..... N86-17885 #
ORNL/TM-9499 ..... N86-18189 #
ORNL/TM-9561 ..... N86-18198 #
ORNL/TM-9564 ..... N86-17755 #
ORNL/TM-9605 ..... N86-18190 #
ORNL/TM-9616 ..... N86-17542 #
ORNL/TM-9646 ..... N86-17585 #
ORNL/TM-9647 ..... N86-18246 #
ORNL/TM-9693 ..... N86-18022 #
ORNL/TM-9729 ..... N86-17911 #

OUEL-1557/84-PT-2 ..... N86-18054 #
OUEL-1562/85 ..... N86-17801 #
OUEL-1567/85 ..... N86-18055 #
OUEL-1570/85 ..... N86-18075 #
OUEL-1577/85 ..... N86-17528
OUEL-1578/85 ..... N86-17480 #
OUEL-1579/85 ..... N86-17481 #

PAM-294 ..... N86-18015 #

PB85-212314 ..... N86-17968 #
PB85-222800 ..... N86-17925 #
PB85-224491 ..... N86-18004 #
PB85-227098 ..... N86-17769 #
PB85-233393 ..... N86-17926 #
PB85-234961 ..... N86-17770 #
PB85-236289 ..... N86-17834 #
PB85-237725 ..... N86-17966 #
PB85-237741 ..... N86-17835 #
PB85-239606 ..... N86-17837 #
PB85-240117 ..... N86-18253 #
PB85-240190 ..... N86-17965 #
PB85-241347 ..... N86-17964 #
PB85-241529 ..... N86-17927 #
PB85-241933 ..... N86-17948 #
PB85-242105 ..... N86-17836 #
PB85-243145 ..... N86-17963 #
PB85-244069 ..... N86-17776 #
PB85-245975 ..... N86-17984 #
PB85-247815 ..... N86-17973 #
PB85-248110 ..... N86-17967 #
PB85-248458 ..... N86-17947 #

PD-NW-85-340R ..... N86-17668 #

PDR/CFDU/IC/17 ..... N86-17689 #
PDR/CFDU/IC/19 ..... N86-17690 #

PFC/CP-85-5 ..... N86-18192 #

PNL-SA-12388 ..... N86-18212 #
PNL-SA-13071 ..... N86-17546 #
PNL-SA-13117 ..... N86-18141 #
PNL-SA-13194 ..... N86-17548 #
PNL-SA-13199 ..... N86-17910 #
PNL-SA-13230 ..... N86-17905 #
PNL-SA-13290 ..... N86-17935 #
PNL-SA-13358 ..... N86-17907 #
PNL-SA-13406 ..... N86-17908 #

PNL-5537 ..... N86-17756 #

PREPRINT-SER-042 ..... N86-18277* #

PREPRINT-447 ..... N86-18279 #
PREPRINT-449 ..... N86-18159 #
PREPRINT-450 ..... N86-18079 #
PREPRINT-451 ..... N86-18239 #
PREPRINT-452 ..... N86-18080 #
PREPRINT-453 ..... N86-18109 #
PREPRINT-454 ..... N86-18240 #
PREPRINT-455 ..... N86-18112 #
PREPRINT-456 ..... N86-18081 #
PREPRINT-457 ..... N86-18241 #
PREPRINT-886 ..... N86-18083 #
PREPRINT-892 ..... N86-18204 #

PTB-W-25 ..... N86-17519 #

PTC-12/77 ..... N86-17783

PUBL-2498 ..... N86-17911 #

PV-M3-449000-PT-1 ..... N86-17490 #
PV-M3-449000-PT-2 ..... N86-17489 #

QR-6 ..... N86-17883* #
QR-11 ..... N86-17816* #

RADC-TR-85-45 ..... N86-17598 #
RADC-TR-85-146 ..... N86-17597 #

RAE-MAT/STRUCT-100-PT-2 ..... N86-17337
RAE-MAT/STRUCT-101-PT-1 ..... N86-17336

RAE-MATER/STRUCT-83 ..... N86-17474

RAE-RAD-NAV-129 ..... N86-17616

RAE-TM-AERO-2007 ..... N86-17306
RAE-TM-AERO-2026 ..... N86-17307
RAE-TM-AERO-2034 ..... N86-17309 #

RAE-TM-P-1044 ..... N86-17702

RAE-TM-SPACE-351 ..... N86-17931 #

RAE-TM-1051(MAT/STR) N86-17473

RAE-TR-83084 ..... N86-17616
RAE-TR-84047 ..... N86-17474
RAE-TR-84084 ..... N86-17336
RAE-TR-84085 ..... N86-17337

RAE-TRANS-2128 ..... N86-17471 #
RAE-TRANS-2137 ..... N86-17500 #

RAND/R-3274-NA ..... N86-18010 #

RARDE-MEMO-50/84-PT-1 ..... N86-17566

REPT-A-3 ..... N86-18073 #

REPT-S-162 ..... N86-18258 #

REPT-1 ..... N86-17985 #
REPT-1 ..... N86-18099 #
REPT-2 ..... N86-17296 #
REPT-26/5052 ..... N86-17724 #
REPT-49 ..... N86-17961 #
REPT-84-40 ..... N86-18098 #
REPT-84-42 ..... N86-18099 #
REPT-85F0298 ..... N86-17817* #
REPT-515 ..... N86-17988
REPT-648-DT-6-ISSUE-1 ..... N86-17364 #
REPT-1570 ..... N86-17550 #
REPT-1578 ..... N86-17551 #
REPT-1645 ..... N86-17586 #
REPT-3881-ISSUE-1-VOL-2 ..... N86-17601 #
REPT-85434 ..... N86-18277* #

RSRE-MEMO-3742 ..... N86-17617 #
RSRE-MEMO-3770 ..... N86-18209 #
RSRE-MEMO-3777 ..... N86-18008 #
RSRE-MEMO-3784 ..... N86-18208
RSRE-MEMO-3825 ..... N86-17618 #

RSRE-85006 ..... N86-18043

RUB-IFM-MITT-42 ..... N86-17786
RUB-IFM-MITT-43 ..... N86-18233

S/T-REPT-VOL-2-NO-8 ..... N86-17636 #
S/T-REPT-VOL-2-NO-10 ..... N86-17924 #
S/T-REPT-VOL-2-NO-11 ..... N86-17360 #

SAAOC-9 ..... N86-18271 #

SAD-125-T ..... N86-17361 #

SAIC-85/1077 ..... N86-18124 #
SAIC-85/1748 ..... N86-18122 #
SAIC-85/3070 ..... N86-18188 #

SAND-83-7450 ..... N86-17983 #
SAND-84-1461 ..... N86-18017 #
SAND-84-1578C ..... N86-18195 #
SAND-85-0044 ..... N86-18018 #
SAND-85-0124C ..... N86-18024 #
SAND-85-0618C ..... N86-18211 #
SAND-85-1013 ..... N86-17940 #
SAND-85-1018 ..... N86-18071 #
SAND-85-1068C ..... N86-18221 #
SAND-85-1180 ..... N86-17310 #
SAND-85-1210C ..... N86-18194 #
SAND-85-1334C ..... N86-17797 #
SAND-85-1509C ..... N86-17751 #
SAND-85-1648C ..... N86-17508 #
SAND-85-1764C ..... N86-17878 #
SAND-85-1779C ..... N86-17676 #
SAND-85-1871C ..... N86-17882 #
SAND-85-2041C ..... N86-17510 #
SAND-85-8229 ..... N86-18236 #

SATCOM-092/PSA/AB/173/84-VOL-1 .... N86-17365 #
SATCOM-092/PSA/AB/173/84-VOL-2 .... N86-17366 #

SD-TR-85-50 ..... N86-17622 #

SE-39 ..... N86-17973 #

SEP-TS/SE/RE/10418/84 ..... N86-17378 #

SERI/CP-251-2680 ..... N86-17875 #

SERI/STR-211-2746 ..... N86-17541 #

SERI/TP-252-2767 ..... N86-17677 #
SERI/TP-253-2744 ..... N86-17877 #

SERI/TR-231-2488 ..... N86-17578 #

SNIAS-852-210-101 ..... N86-17350 #
SNIAS-852-210-102 ..... N86-18133 #
SNIAS-852-210-103 ..... N86-17996 #
SNIAS-852-210-104 ..... N86-17328 #
SNIAS-852-210-105 ..... N86-17329 #
SNIAS-852-320-101 ..... N86-17813 #
SNIAS-852-422-103 ..... N86-17330 #
SNIAS-852-422-104 ..... N86-18257 #
SNIAS-852-430-19 ..... N86-17562 #
SNIAS-852-430-103 ..... N86-17491 #
SNIAS-852-430-104 ..... N86-17561 #
SNIAS-852-430-105 ..... N86-17726 #
SNIAS-852-430-112 ..... N86-17492 #
SNIAS-852-430-113 ..... N86-17493 #
SNIAS-852-430-114 ..... N86-17494 #
SNIAS-852-430-115 ..... N86-17768 #
SNIAS-852-430-116 ..... N86-17495 #
SNIAS-852-430-117 ..... N86-17496 #
SNIAS-852-430-118 ..... N86-17497 #
SNIAS-852-430-119 ..... N86-17498 #

SNPE-NT-27/85/CRB/NP ..... N86-17580 #

SR-12 ..... N86-17958 #

SS-44 ..... N86-17766 #

STN-9 ..... N86-17319 #

SU-SLAC-PUB-3747 ..... N86-18150 #
SU-SLAC-PUB-3754 ..... N86-18140 #

TDCK-79979 ..... N86-18187 #
TDCK-79980 ..... N86-17986 #
TDCK-93143 ..... N86-18131 #
TDCK-93219 ..... N86-17992 #
TDCK-93252 ..... N86-17980 #
TDCK-93253 ..... N86-17993 #
TDCK-93254 ..... N86-17994 #
TDCK-93326 ..... N86-17610 #
TDCK-93327 ..... N86-17723 #

TI85-010472 ..... N86-18111 #
TI85-013272 ..... N86-18017 #
TI85-016420 ..... N86-17795 #
TI85-016573 ..... N86-18018 #
TI85-017151 ..... N86-17934 #
TI85-018278 ..... N86-17983 #
TI85-018522 ..... N86-17905 #
TI85-901169 ..... N86-17796 #

TR-9 ..... N86-18107 #
TR-45 ..... N86-17504 #
TR-47 ..... N86-17620 #
TR-52 ..... N86-17503 #
TR-85-08 ..... N86-18066 #
TR-85-15 ..... N86-18067 #
TR-104 ..... N86-18108 #
TR-362 ..... N86-18106 #
TR-363 ..... N86-18105 #
TR-0084A(5945-02)-3 ..... N86-17622 #
TR-1504 ..... N86-18014 #

TRB/TRR-1003 ..... N86-17770 #

TUM-I8411 ..... N86-18059

UCID-19310-REV-2 ..... N86-18021 #
UCID-20444 ..... N86-17934 #
UCID-20452 ..... N86-18023 #
UCID-20511 ..... N86-18114 #
UCID-20513 ..... N86-17956 #
UCID-20529 ..... N86-18245 #

UCRL-15621 ..... N86-18115 #
UCRL-15622 ..... N86-17628 #
UCRL-15677 ..... N86-17736 #
UCRL-53526-REV-1 ..... N86-17957 #
UCRL-53545 ..... N86-17571 #
UCRL-91032 ..... N86-18049 #
UCRL-91742 ..... N86-18149 #
UCRL-91756 ..... N86-17794 #
UCRL-91914 ..... N86-18157 #
UCRL-92198 ..... N86-17707 #
UCRL-92356-SUPPL-1 ..... N86-17706 #

UCRL-92443 ..... N86-18111 #
UCRL-92444 ..... N86-17507 #
UCRL-92467 ..... N86-17515 #
UCRL-92470 ..... N86-18281 #
UCRL-92700 ..... N86-18152 #
UCRL-93008 ..... N86-17672 #
UCRL-93115 ..... N86-18025 #
UCRL-93245 ..... N86-18185 #
UCRL-93275 ..... N86-18156 #

UIO-SR-85-01 ..... N86-18203 #

UK/DC/TR-10 ..... N86-17569 #

US-PATENT-APPL-SN-625327 ..... N86-17752 #
US-PATENT-APPL-SN-672229 ..... N86-17753 #
US-PATENT-APPL-SN-676046 ..... N86-17978 #
US-PATENT-APPL-SN-676047 ..... N86-17880 #
US-PATENT-APPL-SN-676338 ..... N86-17739 #
US-PATENT-APPL-SN-676343 ..... N86-18215 #
US-PATENT-APPL-SN-678202 ..... N86-18216 #
US-PATENT-APPL-SN-679841 ..... N86-17671 #
US-PATENT-APPL-SN-679842 ..... N86-18217 #
US-PATENT-APPL-SN-685096 ..... N86-17630 #
US-PATENT-APPL-SN-688668 ..... N86-17881 #
US-PATENT-APPL-SN-690218 ..... N86-18218 #
US-PATENT-APPL-SN-692748 ..... N86-17709 #
US-PATENT-APPL-SN-692760 ..... N86-18184 #
US-PATENT-APPL-SN-696549 ..... N86-17740 #
US-PATENT-APPL-SN-696550 ..... N86-17754 #
US-PATENT-APPL-SN-697824 ..... N86-17710 #
US-PATENT-APPL-SN-699879 ..... N86-17711 #
US-PATENT-APPL-SN-702569 ..... N86-17741 #
US-PATENT-APPL-SN-702692 ..... N86-18219 #
US-PATENT-APPL-SN-702715 ..... N86-17625 #
US-PATENT-APPL-SN-702751 ..... N86-17708 #

USAFETAC/DS-85/025 ..... N86-17951 #
USAFETAC/DS-85/026 ..... N86-17954 #
USAFETAC/DS-85/041 ..... N86-17950 #
USAFETAC/DS-85/042 ..... N86-17952 #
USAFETAC/DS-85/046 ..... N86-17953 #

USGS/WDR/MI-84/1 ..... N86-17835 #

USGS/WDR/OK-83/1 ..... N86-17834 #

USGS/WDR/PA-84-3 ..... N86-17837 #

USGS/WDR/VA-84/1 ..... N86-17836 #

USGS/WRD/HD-85/217 ..... N86-17834 #
USGS/WRD/HD-85/226 ..... N86-17836 #
USGS/WRD/HD-85/228 ..... N86-17837 #
USGS/WRD/HD-85/229 ..... N86-17835 #

USIP-85-10 ..... N86-18172 #
USIP-85-13 ..... N86-18164 #
USIP-85-14 ..... N86-18173 #
USIP-85-15 ..... N86-18174 #
USIP-85-16 ..... N86-18175 #

UVA/528209/AM86/108 ..... N86-17998* #
UVA/528212/EE85/101 ..... N86-18179* #

VKI-LS-1985-02 ..... N86-17895 #

VKI-TM-35 ..... N86-17682 #

VKI-TN-152 ..... N86-17680 #
VKI-TN-153 ..... N86-17681 #

VTH-LR-307 ..... N86-17314 #
VTH-LR-309 ..... N86-17805 #
VTH-LR-310 ..... N86-17991 #
VTH-LR-312 ..... N86-17806 #
VTH-LR-313 ..... N86-17807 #
VTH-LR-315 ..... N86-17344 #
VTH-LR-360-PT-2 ..... N86-17345 #

VTT-RR-357 ..... N86-17698 #

WAPD-T-2869 ..... N86-18020 #

WES/MP/GL-85-19 ..... N86-17932 #

WHOI-85-30 ..... N86-18123 #

WM-068 ..... N86-17838
WM-074 ..... N86-17313 #
WM-075 ..... N86-17888 #
WM-090 ..... N86-17889 #

WMO-47-ED-85 ..... N86-17971 #
WMO-636 ..... N86-18003 #
WMO-639 ..... N86-17958 #
WMO-644 ..... N86-17959 #

Y/DW-592 ..... N86-17772 #

YALEU/DCS/RR-411 ..... N86-18125 #

Z-50551 ..... N86-17697 #

ZW-8411 ..... N86-18072 #

★U.S. GOVERNMENT PRINTING OFFICE: 1986-491-573/40006

FEDERAL DEPOSITORY LIBRARIES

ALABAMA

AUBURN UNIV. AT MONTGOMERY LIBRARY
Documents Department
Montgomery, AL 36193
(205) 279-9110, ext. 253

UNIV. OF ALABAMA LIBRARY
Documents Dept.—Box S
University, AL 35486
(205) 348-7369

ARIZONA

DEPT. OF LIBRARY, ARCHIVES AND PUBLIC RECORDS
Third Floor—State Cap.
1700 West Washington
Phoenix, AZ 85007
(602) 255-4121

UNIVERSITY OF ARIZONA LIB.
Government Documents Dept.
Tucson, AZ 85721
(602) 626-5233

ARKANSAS

ARKANSAS STATE LIBRARY
One Capitol Mall
Little Rock, AR 72201
(501) 371-2326

CALIFORNIA

CALIFORNIA STATE LIBRARY
Govt. Publications Section
P.O. Box 2037
Sacramento, CA 95809
(916) 322-4572

COLORADO

UNIV. OF COLORADO LIB.
Government Pub. Division
Campus Box 184
Boulder, CO 80309
(303) 492-8834

DENVER PUBLIC LIBRARY
Govt. Pub. Department
1357 Broadway
Denver, CO 80203
(303) 571-2131

CONNECTICUT

CONNECTICUT STATE LIBRARY
Government Documents Unit
231 Capitol Avenue
Hartford, CT 06106
(203) 566-4971

FLORIDA

UNIV. OF FLORIDA LIBRARIES
Library West
Documents Department
Gainesville, FL 32611
(904) 392-0367

GEORGIA

UNIV. OF GEORGIA LIBRARIES
Government Reference Dept.
Athens, Ga 30602
(404) 542-8951

HAWAII

UNIV. OF HAWAII LIBRARY
Govt. Documents Collection
2550 The Mall
Honolulu, HI 96822
(808) 948-8230

IDAHO

UNIV. OF IDAHO LIBRARY
Documents Section
Moscow, ID 83843
(208) 885-6344

ILLINOIS

ILLINOIS STATE LIBRARY
Information Services Branch
Centennial Building
Springfield, IL 62706
(217) 782-5185

INDIANA

INDIANA STATE LIBRARY
Serials Documents Section
140 North Senate Avenue
Indianapolis, IN 46204
(317) 232-3686

IOWA

UNIV. OF IOWA LIBRARIES
Govt. Documents Department
Iowa City, IA 52242
(319) 353-3318

KANSAS

UNIVERSITY OF KANSAS
Doc. Collect—Spencer Lib.
Lawrence, KS 66045
(913) 864-4662

KENTUCKY

UNIV. OF KENTUCKY LIBRARIES
Govt. Pub. Department
Lexington, KY 40506
(606) 257-3139

LOUISIANA

LOUISIANA STATE UNIVERSITY
Middleton Library
Govt. Docs. Dept.
Baton Rouge, LA 70803
(504) 388-2570

LOUISIANA TECHNICAL UNIV. LIBRARY
Documents Department
Ruston, LA 71272
(318) 257-4962

MAINE

UNIVERSITY OF MAINE
Raymond H. Fogler Library
Tri-State Regional Documents Depository
Orono, ME 04469
(207) 581-1680

MARYLAND

UNIVERSITY OF MARYLAND
McKeldin Lib.—Doc. Div.
College Park, MD 20742
(301) 454-3034

MASSACHUSETTS

BOSTON PUBLIC LIBRARY
Government Docs. Dept.
Boston, MA 02117
(617) 536-5400 ext. 226

MICHIGAN

DETROIT PUBLIC LIBRARY
Sociology Department
5201 Woodward Avenue
Detroit, MI 48202
(313) 833-1409

MICHIGAN STATE LIBRARY
P.O. Box 30007
Lansing, MI 48909
(517) 373-0640

MINNESOTA

UNIVERSITY OF MINNESOTA
Government Pubs. Division
409 Wilson Library
309 19th Avenue South
Minneapolis, MN 55455
(612) 373-7813

MISSISSIPPI

UNIV. OF MISSISSIPPI LIB.
Documents Department
University, MS 38677
(601) 232-5857

MONTANA

UNIV. OF MONTANA
Mansfield Library
Documents Division
Missoula, MT 59812
(406) 243-6700

NEBRASKA

NEBRASKA LIBRARY COMM.
Federal Documents
1420 P Street
Lincoln, NE 68508
(402) 471-2045
In cooperation with University of Nebraska-Lincoln

NEVADA

UNIVERSITY OF NEVADA LIB.
Govt. Pub. Department
Reno, NV 89557
(702) 784-6579

NEW JERSEY

NEWARK PUBLIC LIBRARY
5 Washington Street
Newark, NJ 07101
(201) 733-7812

NEW MEXICO

UNIVERSITY OF NEW MEXICO
Zimmerman Library
Government Pub. Dept.
Albuquerque, NM 87131
(505) 277-5441

NEW MEXICO STATE LIBRARY
Reference Department
325 Don Gaspar Avenue
Santa Fe, NM 87501
(505) 827-2033, ext. 22

NEW YORK

NEW YORK STATE LIBRARY
Empire State Plaza
Albany, NY 12230
(518) 474-5563

NORTH CAROLINA

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
Wilson Library
BA/SS Documents Division
Chapel Hill, NC 27515
(919) 962-1321

NORTH DAKOTA

UNIVERSITY OF NORTH DAKOTA
Chester Fritz Library
Documents Department
Grand Forks, ND 58202
(701) 777-2617, ext. 27
(In cooperation with North Dakota State Univ. Library)

OHIO

STATE LIBRARY OF OHIO
Documents Department
65 South Front Street
Columbus, OH 43215
(614) 462-7051

OKLAHOMA

OKLAHOMA DEPT. OF LIB.
Government Documents
200 NE 18th Street
Oklahoma City, OK 73105
(405) 521-2502

OKLAHOMA STATE UNIV. LIB.
Documents Department
Stillwater, OK 74078
(405) 624-6546

OREGON

PORTLAND STATE UNIV. LIB.
Documents Department
P.O. Box 1151
Portland, OR 97207
(503) 229-3673

PENNSYLVANIA

STATE LIBRARY OF PENN.
Government Pub. Section
P.O. Box 1601
Harrisburg, PA 17105
(717) 787-3752

TEXAS

TEXAS STATE LIBRARY
Public Services Department
P.O. Box 12927—Cap. Sta.
Austin, TX 78753
(512) 471-2996

TEXAS TECH UNIV. LIBRARY
Govt. Documents Department
Lubbock, TX 79409
(806) 742-2268

UTAH

UTAH STATE UNIVERSITY
Merrill Library, U.M.C. 30
Logan, UT 84322
(801) 750-2682

VIRGINIA

UNIVERSITY OF VIRGINIA
Alderman Lib.—Public Doc.
Charlottesville, VA 22901
(804) 924-3133

WASHINGTON

WASHINGTON STATE LIBRARY
Documents Section
Olympia, WA 98504
(206) 753-4027

WEST VIRGINIA

WEST VIRGINIA UNIV. LIB.
Documents Department
Morgantown, WV 26506
(304) 293-3640

WISCONSIN

MILWAUKEE PUBLIC LIBRARY
814 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 278-3000

ST. HIST LIB. OF WISCONSIN
Government Pub. Section
816 State Street
Madison, WI 53706
(608) 262-4347

WYOMING

WYOMING STATE LIBRARY
Supreme Ct. & Library Bld.
Cheyenne, WY 82002
(307) 777-6344

National Aeronautics and
Space Administration
Code NIT-4
Washington, D.C.
20546
Official Business
Penalty for Private Use, $300

SPECIAL FOURTH-CLASS RATE
POSTAGE & FEES PAID
NASA

PERMIT No. G 27

NASA

POSTMASTER: If Undeliverable (Section 158
Postal Manual) Do Not Return